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ABSTRACT

This report presents the findings from a 2-stage, multi-method study conducted in 2000 and 2001 on the editing skills and processes which students at two schools in New Zealand used when working with word processors and with pencils. The study's main aim was to examine the influence of the use of a word processor on students' editing processes and writing products. In addition, the relationships between the year level, gender, and literacy level of the students in the study, and their editing processes and products were examined. Comparable data were collected from 96 students in Years 3/4, 5, and 7. Data were collected by using interviews and observations, and by analyzing the writing samples of students. Each student was observed completing two tasks--one using a word processor and the other using a pencil. The 21 teachers involved were interviewed about their teaching of writing and editing skills, and the place of word processors in their classroom writing program. Overall, the Year 7 students reported greater school computer use than the Year 5 students, who in turn reported greater use than the Year 3/4 students. In general, students showed high levels of motivation when using a word processor. Apart from spelling differences, there were no significant differences in the overall quality of the writing samples by writing mode. Appended are sample parent and teacher letters, teacher and student interviews and other materials. (Contains 9 tables, 3 figures, and 20 references.) (NKA)

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Techno Magic – WHIZZ OR FIZZ?

The relationship between writing mode, editing process, and writing product

Sally Boyd and Sue McDowall

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Sally Boyd and Sue McDowall

New Zealand Council for Educational Research
Te Rūnanga o Aotearoa mō te Rangahau i te Mātauranga
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EXECUTIVE SUMMARY

This report presents the findings from a two-stage, multi-method study conducted in 2000 and 2001 on the editing skills and processes which students at two schools used when working with word processors and with pencils. The main aim of the study was to examine the influence of the use of a word processor on students' editing processes and writing products. In addition, the relationships between the year level, gender, and literacy level of the students in the study, and their editing processes and products were examined. Comparable data were collected from 96 students in years 3/4, 5, and 7.

Data were collected by using interviews and observations, and by analysing the writing samples of students. Each student was observed completing two tasks – one using a word processor and the other using a pencil. For recording purposes, the editing changes made as each student wrote were recorded as being part of the "writing phase," while changes made on completion of the task were recorded as being part of the "editing phase". The completed writing samples were typed without correction, and were then rated in terms of quality, using a number of scales developed for the study. The students were interviewed about their editing processes, computer experience, and interest in writing. The 21 teachers of the students involved in the study were interviewed about their teaching of writing and editing skills, and the place of word processors in their classroom writing programme.

Most students and teachers reported that school computers were used for writing once a month or less. Overall, the year 7 students reported greater school computer use than the year 5 students, who in turn reported greater use than the year 3/4 students. Students from the low literacy group reported a lower rate of school computer use than their counterparts in the high literacy group. Students of all year levels reported a higher frequency of home computer use than of school computer use.

Most teachers reported that word processors were mainly used for publishing writing that had already been drafted with a pencil, and that they did not formally teach students specific skills for editing and proof-reading on a word processor. Several said that they believed students already had these skills. However, observations of students writing on a word processor revealed that some did not know how to use spellcheck, while others had only a superficial understanding of this tool, and some did not understand basic features such as the use of the return key.

Although students took longer on average to complete tasks when using a word processor, because of their typing speed, the word-processed writing samples were similar in length to the pencil-written ones. In general, when students used a word processor, they spent approximately the same length of time editing as when they used a pencil, but they made more editing changes. When students used a word processor, they did most of their editing during the "writing phase" (often prompted by spellcheck); but when they used a pencil, they tended to do more of their editing during the "editing phase". Over half of the students in the study reported that they thought editing with a computer was easier than editing by hand, because of the presence of the spellcheck. In general, when students used a word processor, they persevered for longer when attempting to correct particular words and made more changes to spelling overall. Consequently their word-

processed samples had fewer spelling errors than the pencil-written samples. Apart from spelling differences, there were no main significant differences in the overall quality of the writing samples by writing mode.

There were noticeable differences in the skills and processes used by students of different year levels. The year 7 students wrote more, completed writing tasks more quickly, had better keyboard skills, and made more use of the sophisticated functions of spellcheck than students at lower year levels. They made similar types of editing changes as the year 5 students, but were more likely to re-craft the content of their work. The editing changes made by the year 3/4 students were of a simpler nature than those made by students at the other year levels. In general, the year 3/4 students had more positive views about writing than the year 7 students.

The work produced by students in the low literacy group gained lower ratings on all of the quality measures used. Students in the low literacy group reported more positive attitudes towards writing with a computer than writing in general. However, the fact that they reported using school computers less frequently than those in the high literacy group suggests that their increased motivation for writing when using computers was not being used to advantage. Students in the low literacy group reported that they had fewer keyboard skills than the students in the high literacy group. This could be linked to the fact that these students reported a lower rate of usage of both school and home computers, and so had less opportunity to develop these skills.

The differences by gender were all in the girls' favour. The girls wrote more, re-crafted the content of their work more, and were more positive about writing in general than the boys. While girls were more likely to report positive attitudes towards writing in general, there was no significant difference in the attitudes of girls and boys towards using word processors for writing.

In general the students showed high levels of motivation when using a word processor. The fact that students with low literacy levels viewed writing with a computer more positively than writing in general suggests that the computer could be used successfully as a motivational and instructional tool for these students.

Using a word processor helped students to identify and correct spelling errors in their writing. The fact that there were no other significant differences in the quality of the writing samples produced could indicate that writing mode has little influence on writing product. However, this finding could also be partly due to classroom context. Most teachers in the study reported that they did not formally teach students how to use a word processor for editing text, nor did they provide students with many opportunities to write first drafts on the computer. It is possible that if all the students in the study had been formally taught how to use a word processor for the purposes of editing, had been provided with opportunities to practice these skills, and had delayed making surface level editing changes until after the composing process, differences in the quality of their word-processed and pencil-written drafts may have been evident. If students are to benefit from the editing tools of word-processing packages, it is important that they are taught how to use these tools, and are provided with opportunities to use computers for crafting as well as presentation purposes.

INTRODUCTION

This report summarises the results of a two-stage, multi-method study, combining qualitative and quantitative data, on the editing strategies that students employ when using different writing tools. The first stage of the study, conducted in 2000, focused on students in year 5. The second, conducted in 2000 to 2001, broadened the focus to include students in years 3/4 and year 7. In both studies, students were observed as they wrote and edited two pieces of writing, one using a word-processing package, and the other using a pencil and lined paper.

Background and related research

The number of computers available for student use in New Zealand schools is steadily increasing, and word-processing is reported to be one of the most frequently used computer applications (Ministry of Education, 1999; Rocha, 2000). Despite this, there are few New Zealand studies on the impact of word processors on students' writing. Two of the main studies are Parr (1992) and Philips (1995). Parr (1992) conducted a one-year evaluation of a school innovation in which two Form 3 classes were provided with laptop computers to use at school and at home. Students reported enjoying writing more when they used a word processor. Two of the reasons for this greater enjoyment were that students thought it was quicker to use a word processor, and they perceived the quality of their work to be better. Philips (1995) conducted an 18-month case study on the impact of the use of word processors on the writing of nine primary school children at different year levels. He found that the impact of word processor use differed according to the child.

A number of overseas studies have compared work produced on a word processor with that produced by hand, reporting on differences in features such as quality and length. Dybdahl *et al.* (1997) found no significant difference in the quality or quantity of the expository composition work produced by fifth grade students using a word processor and the work produced by hand. In contrast, in a study carried out by Breese *et al.*(1996), the narrative writing produced by year 7 students on a word processor was rated as significantly better on three out of four of the quality criteria than that produced by hand. Snyder (1990) found that, for year 8 students, qualitative differences were genre related. In the genres of argument and report writing, students produced texts of significantly higher quality when they used a word processor than when they wrote by hand. In the genre of narrative, word-processed texts were ranked higher, but not significantly so.

While the study reported on here did compare the quality of word-processed and hand-written writing samples, its main focus was on comparing students' editing processes and skills according to the writing tool used. The emphasis was placed here for a number of reasons. One was that revision is considered a fundamental part of the writing process (Graves, 1983). Dahl and Farnan (1998) described it as, "the key to learning the craft of writing, not only a critical dimension for producing improved final drafts but also a vehicle for gaining process understanding" (p.57). This view is reinforced by Dix (2000), who sees revision as being "strongly linked to the writer's

cognitive development of language" (p.41). The availability of editing tools such as spellcheck, and facilities such as cut and paste, provided another reason for focusing on writing processes as well as products. If the availability of these tools influences the way students edit their work, this has implications for the way in which writing is taught.

The type of editing changes, and the stage in the writing process at which these changes are made, when word processors are used is discussed in the literature. Snyder (1990) described the way in which "revision-focused studies suggest that the use of word processors does not increase meaning related, higher-order revision, as distinct from surface-level changes, at least among student writers" (p.7). Joram *et al.* (1992) came to similar conclusions in their review of the literature.

The concern that surface level revision seems to occur during the composing phase of the writing process, when word processors are used, is also discussed in the literature. Joram *et al.* (1992) argued that:

> If writing with word processors encourages surface revision throughout the writing process, beginning with the initial phase of a writing task, writers may engage in premature evaluation of their ideas and produce less creative final drafts (p.170).

The view that surface level revision is best done towards, or at the end of, the composing process is an established one (Graves, 1983). *Dancing With the Pen* states that "concern with changes to surface features...[at the writing and revising stage]... may hinder the composing process, as attention is diverted from the meaning of the writing" (Ministry of Education, 1992, p. 24).

Other research has concentrated on students' use of spellcheck when writing, for example, a study carried out by MacArthur *et al.* (1996) focused on several problems associated with spellcheck use by students with learning disabilities. One was the identification by spellcheck of proper nouns and unusual words as errors. Another was the problem that occurred when students were unable to identify the correct word from the list of suggestions offered by spellcheck. A third was the failure of spellcheck to identify incorrect words when these were correct spellings of other words, such as homophones. MacArthur *et al.* (1996) found that while the first two problems outlined above were not significant, the last one was, suggesting that further research was needed into the area of the "real word problem".

Many of the studies on writing with word processors have focused on students at a particular class level. However, it may be that the benefits of word processor use differ according to the age/developmental stage of the writer. Graves (1983) describes the way in which children change what is important to them in their concept of the writing process, moving from a focus on features such as spelling and punctuation to a focus on major revisions, involving the addition, exclusion, and re-organisation of information, as they develop as writers.

There is a need for a comparison between the writing processes and products by gender when word processors are used. Studies conducted overseas and in New Zealand have indicated that in general, girls are ahead of boys in terms of their literacy development. The document *New Zealand Schools: Nga Kura o Aotearoa: A report on*

the compulsory schools sector in New Zealand 1999 (Ministry of Education, 2000) has summarised current data on gender differences in New Zealand. This report stated that primary school-age girls out-performed boys on literacy measures in *School Entry Assessment* data, in an International Education Association study on reading literacy, in National Monitoring Project data on literacy, and on *Progressive Achievement Test* (PAT) scores.

Studies relating gender and computer use, conducted both overseas and in New Zealand, have found that boys report, and in some cases make, greater use of computers than their female counterparts. Pelgrum *et al.* (1993) conducted a large international study of computer use in schools. They found that in most schools, computers were used predominantly by boys. In a New Zealand national survey carried out by Crooks and Flockton (1997), involving a sample of 1440 year 4 students and 1440 year 8 students, both year 4 and 8 boys reported greater computer usage outside school than girls, and the year 8 boys reported greater computer usage at school than girls. Given that girls perform better in the area of literacy and that boys report greater use of computers, it is worth pursuing the question of whether boys or girls demonstrate better editing processes and/or produce better writing products when computers are used.

Claims have been made about the motivational benefits of using a word processor (Watson, 1993; Shears, 1995; Rowe, 1993), particularly for those students who do not like writing or have learning difficulties (Westwood, 1999; Parr, 1991). This has been confirmed in a number of studies. For example, research carried out by Breese *et al.* (1996) showed that, "Children who are reluctant to redraft using pen and paper will happily do so on the word processor..." (p.88). A general trend in terms of students' enjoyment in using computers is reported in the 1998 NEMP writing assessments (Flockton & Crooks, 1999). One of the NEMP tasks involved students editing two pieces of work, one using a word-processing package and the other by hand. Flockton and Crooks reported that the amount of editing completed on the two pieces of work was approximately the same, but larger proportions of students reported liking the computer-based tasks (71%) than the pencil and paper task (30%). However, there is some evidence that the "novelty effect" of computers, and thus their motivational impact, might be wearing off as home computer ownership, and school usage, grows (Pelgrum & Plomp, 1996).

There has been steadily growing recognition of the importance of integrating new technologies into the New Zealand curriculum. *English in the New Zealand Curriculum* (Ministry of Education, 1994) emphasised the importance of students developing an understanding of tools such as word processors. The document *Dancing with the Pen* (Ministry of Education, 1992) discussed how word processors could be used for the purposes of revision. In 1998, a national strategy, *Interactive Education: An Information and Communication Technologies Strategy for Schools* was published by the Ministry of Education. This strategy is likely to facilitate changes in the priority given to use of information and communication technology (ICT) in New Zealand schools. Given this focus on ICT, and the current emphasis on literacy, research into the use of word-processing packages and the impact this has on students' writing processes and products is timely. This study builds on work carried out in earlier studies by focusing on students'

editing skills and processes, and on the way in which these differ according to writing mode, year level, literacy level, and gender.

Research aims and questions

The two main questions and related subsidiary questions examined in this study are outlined below:

1. What processes do students use to edit their work?
   - Do these processes differ according to writing mode, year level, literacy level, and/or gender?

2. How does the use of word-processing packages influence the way students edit and proof-read their work?
   - How do the editing processes students use differ when different writing tools are used, and how does this differ according to year level, literacy level, and gender?
   - How does the use of word-processing packages impact upon the quality of work produced by students overall, and by year level, literacy level, and/or gender in particular?
   - How does the use of spelling and grammar checks impact on students' ability to self-correct?

Definition of terms

The term "editing" has been used in this study in place of the term "revising", which is often found in the literature, as editing is the term more commonly used in New Zealand classrooms. For the purposes of this study, an editing change encompassed both re-crafting and proof-reading, and was defined as "every instance in which a student altered something previously written or typed". Examples of editing changes included altering the spelling of a word, inserting or deleting a word or a sentence fragment, re-ordering a sentence, or changing font.

Method

A multi-method case study design, incorporating both qualitative and quantitative information, was used for this study. Studies of this type have been shown to provide a more comprehensive understanding of a phenomenon than single-method studies (Yin, 1994; Creswell, 1994; Snyder, 1999).

In this study, the writing processes of students were observed while they were completing two tasks – one using a word processor, and one by hand. Students and teachers were interviewed in order to collect information about the classroom environment, as well as about teachers' and students' approaches to editing, proof-reading, and writing on computers.

Sampling

Sample of schools

Two schools were selected for the study. As part of the selection process, teachers working in the ICT area were approached to nominate full primary schools in which ICT use was integrated into the curriculum, and/or which had been part of recent information technology professional development contracts. Both schools selected had an ICT configuration common to many primary schools: one or two computers in every classroom, as well as a small suite of computers centrally located in another classroom. One school used MSWord 97 for word-processing; the other used MSWord 2000. Both were high decile schools with rolls of more than 300, situated in the greater Wellington urban area.

Sample of students

A total of 96 students were interviewed and observed completing two writing tasks. From the two schools, 32 students at each year level (years 3/4, 5, and 7) were selected to take part in the study. Even numbers of boys and girls, and even numbers of students with low and high literacy levels, were selected at each year level (Table 1).

Table 1: Sample of Students by Year Level, School, Literacy Level, and Gender

Year Level	*School*	*Literacy Level*	*Gender*
Year 3/4	1	High	4 girls
			4 boys
		Low	4 girls
			4 boys
	2	High	4 girls
			4 boys
		Low	4 girls
			4 boys
Year 5	1	High	4 girls
			4 boys
		Low	3 girls
			4 boys
	2	High	4 girls
			4 boys
		Low	5 girls
			4 boys
Year 7	1	High	4 girls
			4 boys
		Low	5 girls
			4 boys
	2	High	4 girls
			4 boys
		Low	3 girls
			4 boys
Total			96 students

The literacy levels of the year 5 and 7 students were determined by using their class percentile ranks from the *Progressive Achievement Tests of Reading,* and through consultation with teachers. As students at year 3 do not sit the *Progressive Achievement Tests of Reading* (PATs), their literacy levels were determined by using class percentile ranks from the *Progressive Achievement Test of Listening*, teacher records of students' writing and reading skills, and through consultation with teachers. On the whole, students in the low literacy group scored between 10% and 40% on the PATs that were used in the study, and students in the high literacy group scored between 80% and 90%. Recent immigrants for whom English was a second language, students with class percentile rankings under 10%, and/or whom school staff suggested would be unsuitable for the study, were not included in the sample.

Sample of teachers

A total of 21 teachers were included in the study, that is, six year 3 or 4 teachers, six year 5 teachers, one teacher who taught year 5 during the first year of the study and year 4 in the second, and eight year 7 teachers. Twelve of the teachers came from one of the schools in the study, and nine came from the other.

Informed consent

A letter of introduction and a consent form were sent to the parents/caregivers of the students selected for the study (see Appendices A and B, respectively). The teachers to be interviewed also received an introductory letter and consent form (see Appendices C and D respectively).

Research process and instruments

Pilot

Prior to data collection, all student instruments and one of the instruction tasks were piloted on three year 5 students at a local school. All four writing tasks and the redrafted student instruments were then piloted at a second school. The teacher interview was piloted on a teacher who taught year 5 at this school. During the pilot, both researchers observed the same child working. The observations made were then compared to ensure that the two researchers were categorising editing changes in the same way, and to establish other common understandings. This process was repeated a number of times to ensure inter-rater reliability.

Following the data collection in 1999 to 2000, minor modifications were made to the student interview schedule and observation checklist. The instruments were then piloted on six year 3 students in October 2000. As a result of this pilot, minor modifications to the interview schedule were made to make the questions clearer for the younger age group. No changes were made to the writing tasks.

Teacher interviews

The teachers who taught students in the study were interviewed about:

- their expectations of the editing skills of students at the year level they were teaching
- their teaching of writing and editing skills
- their approach to teaching these skills when students were using a word-processing package
- how often, and for what purpose, students used word-processing packages or other applications for writing.

(See Appendix E for a copy of the teacher interview.)

Student interviews

At the beginning of the study, each student was interviewed by one of the researchers. The interview had a dual purpose. The first was to collect information on students' proof-reading and editing processes, computer experience, and interest in writing. The second was to provide an opportunity for the researchers to introduce themselves to the students and build rapport prior to the observation period.

In order to help students feel comfortable in the research context, they were interviewed two at a time in the same room, but by different researchers. In most cases, the students in each pair were from the same literacy group and of the same gender. (See Appendix F for a copy of the student interview schedule.)

Writing tasks

At each year level, half of the students (including 50% of each gender and 50% of each literacy group) completed two parallel poetic writing tasks on two different days, one using a word processor, the other using a pencil. The other half (also including 50% of each gender and 50% of each literacy group) completed two parallel transactional writing tasks, one with a word processor and the other with a pencil. The order of the tasks was counter-balanced between the two schools. The nature of the tasks is described below.

Poetic writing tasks

Both the poetic writing tasks required students to retell a legend in their own words after it was read to them. The legends used were *Rona and the Moon* (Bacon, 1984) and *Kakariki* (Insley, 1988). These legends were of comparable length, story complexity, and readability. The noun frequency method developed by Elley and Croft (1989) was used to ascertain readability. Some of the more complex words in one legend were modified to make the legends comparable. Students were given the same instructions for each of the poetic writing tasks (see Appendix G). Students were given an illustration from the story, with the title of the story written above it, to facilitate their retelling (see Appendices H and I).

Transactional writing tasks

Both the transactional writing tasks required students to write a set of instructions on how to play a game; one was 'Snakes and Ladders' and the other was 'Snap'. Students were given the same instructions, verbally and in writing, for the two writing tasks. Students were also given a picture of the game they were to write instructions for, with its title written above it. (For the verbal instructions given by the researchers for the 'Snakes and Ladders' task, see Appendix J; for the student instructions, see Appendix K; for the verbal instructions for the 'Snap' task, see Appendix L; for the student instructions, see Appendix M.)

Introducing the writing tasks to students

Each writing task was introduced by one of the researchers to two students at a time. Following this, both students completed the task, one using a word processor, and the other using a pencil. In nearly all instances, two students and two researchers worked on the same task in the same area, in order to ensure that all students had a peer present and felt comfortable in the situation. Students completing the task by hand were given lined paper to write on. To provide the same starting point for students using a word processor, a master document was set up prior to their arrival, with a large font size and margins the size of the page.

Observation of the writing process

As each student wrote, they were observed by one of the researchers, and the editing changes they made were recorded. Although it is recognised that editing occurs throughout the writing process, for recording purposes the editing changes made by students were divided into two phases. The editing changes students made as they wrote were categorised as being in the "writing phase"; the changes they made once the first draft was completed were categorised as being in the "editing phase".

If students asked for assistance while they were completing a task, they were directed to use the solutions they would normally use in class. A school dictionary and *Spell-Write* (Croft & Mapa, 1998) were available for students to use. In a couple of instances, students who asked for help with word-processing functions were assisted if they had a clear idea of the editing they wished to do, but were not sure of exactly how to go about it.

Observations during the writing phase

As the researchers observed the students writing, they recorded each editing change made on an observational checklist. The checklist included a set of categories for surface features, such as spelling, grammar, punctuation, and layout, and a set of categories for deep features, such as paragraphing, re-wording, and re-ordering. The checklist also included a place to rate students' keyboard skills, and to record whether or not they used spellcheck, a dictionary, or other spelling aids. (For the checklist, see Appendix N.)

Observations during the editing phase

On completion of their draft, each student was asked to edit and proof-read their work. Students were observed as they carried this out. Any editing changes made during the "editing phase" were also recorded. Those students using a word processor edited their work on the screen. A copy of their first draft was printed off as a record of their work prior to the "editing phase". Those students using a pencil carried out their editing with a pen, so that changes made at the "editing phase" could be distinguished from those made at the "writing phase".

Post-observation interview

After the students had completed each writing task, they were asked to identify and explain the changes they had made during the course of both the "writing phase" and the "editing phase". The researchers then drew students' attention to any other major changes they had made, but had not identified, and asked them to explain these. Student explanations were recorded on a post-observation interview form. This was used by the researchers to double-check that the editing changes observed had been correctly classified. (For the forms used when students wrote using a word processor and using a pencil, see Appendices O and P respectively.)

Assessing the writing samples

In order to find out whether the use of a word processor influenced the writing products of students, a number of measures were developed to assess the deep and surface features of the writing samples produced. The measures developed included both global rating scales for making judgments about the overall quality of the writing samples, and scales specific to particular writing skills, such as punctuation use. The measures were used to ascertain if there were any differences in writing quality by mode of writing, year level, gender, and literacy level. To ensure that all the writing samples looked the same, they were typed without correction prior to the application of the quality measures.

Global quality

A panel consisting of two teachers and the two authors compared the word-processed and pencil-written samples produced by each child. They used a set of criteria for comparing the writing samples as a basis for determining if there was a difference in overall quality between the two pieces of work. (For these criteria, see Appendix Q.) Each member of the panel independently identified whether there was a difference in quality between the two samples and, if so, which one was better. The group then discussed this until consensus was reached, with panel members justifying their decisions according to the criteria provided.

Grammar and syntax, punctuation, and layout

Two rating scales were developed by the researchers; one for the use of punctuation, and the other for the grammar and syntax in each writing sample. These scales were adapted from the scales used for the evaluation of students' writing in *Competent Children at 8:*

Families, Early Education, and Schools (Wylie *et al.*, 1999). A teacher who had not been involved in the data collection used these scales to rate the punctuation and the grammar and syntax of each writing sample. In addition, the researchers developed a scale for assessing the use of layout features, such as bullet points and sub-headings. This scale was used only on the instruction writing samples. (For these scales, see Appendix R.)

Word count, spelling, and vocabulary

The length of each writing sample was determined using a running word count. Five spelling and vocabulary counts were used to analyse the quality of the writing samples. These measures were:

1. Running count (a total count of all the spelling errors made).
2. Dictionary count (a count of each spelling error the first time it appeared).
3. Homophone count (a count of words that sounded the same but were spelt incorrectly, for example, to, too, or two).
4. Context count (a count of words spelt correctly but used in the wrong context, for example, clod for cloud).
5. Vocabulary count (a count of all words of seven letters or longer).

The first four measures were developed by adapting the spelling measures outlined in *Do Spelling Tests Measure the Ability to Spell*? (Croft, 1982), and those used in the development work for *Spell-Write* (Croft & Mapa, 1998). The fifth measure, vocabulary count, was adapted from Hammill and Larsen's (1988) contextual vocabulary score in the *Test of Written Language*. (For a set of instructions outlining the way in which these measures were applied, see Appendix S.)

Data analysis

The dataset was comprised of information gathered from the interviews with the 21 teachers in the sample, the observations and interviews of the 96 students in the sample, and the quality ratings of the students' writing samples. Codes were developed for the open-ended questions by analysing 20% of the interviews for themes. The open-ended questions were coded and the interview schedules were checked before the data were entered into a SAS database. The teacher interviews were analysed for themes.

Frequencies and cross-tabulations by writing mode, year level, gender, and literacy level were run on most variables in the dataset. A t-test was used to compare means and a chi-square test was used to determine frequencies. When statistically significant differences were found, the phrases "more likely", "less likely", "statistically significant", or "significant" were used to indicate this. Only differences with a probability equal to or beyond 0.05 are reported. In some cases percentages did not sum to 100%; this was due to rounding or the opportunity for multiple responses to some questions.

Feedback to schools

In August 2000, a summary of the findings from the first stage of the study was sent to the teachers and principals who took part. A summary encompassing the combined results

of both stages was sent to all teachers and principals involved in either of the stages in May 2001. Preliminary findings from the 1999 to 2000 stage of the study are reported in Boyd and McDowall (2000).

Editing changes

While they were completing the writing tasks, all students made at least some editing changes to their work. When the total numbers of changes made in both the "writing" and the "editing" phase were combined, the average number of changes was relatively constant across all the year groups. Overall, students made an average of 20 changes, with a minimum of 2, and a maximum of 93.

Differences in editing changes by writing mode

Students on average made significantly more editing changes when they worked on a word processor (25 changes) than when they worked with a pencil (16 changes).

The types of alterations most frequently made by students when using a word processor were changes to layout, spelling, and apostrophes. Layout changes mostly involved correcting the spacing of letters and words. Students with fewer keyboard skills tended to make more of these changes, as they had made more "typos". There were no editing changes that students made significantly more frequently when they were writing with a pencil.

When layout changes were removed from the total count of editing changes, students still made significantly more editing changes on average when they worked on a word processor (19 changes) than when they worked with a pencil (15 changes).

One of the main ways in which students attempted to improve the quality of their work was by re-crafting, that is, making word or sentence changes or re-ordering sentences or paragraphs. Overall, students made an average of three re-crafting changes in each piece of writing, whether they were working on a word processor or with a pencil.

Differences in editing changes by phase and writing mode

Students made significantly more changes on average during the "writing phase" when they used a word processor (20) than they did when they used a pencil (9). In contrast, students made significantly more changes during the "editing phase" when they used a pencil (7) than they did when they used a word processor (5).

Writing phase

At the "writing phase", students (especially year 5) made significantly more of certain types of changes when they used a word processor than when they used a pencil. These changes involved:

- spelling (years 3/4, 5, and 7)
- capitals (year 5)
- commas (year 5)
- apostrophes (year 5)
- re-wording sentences (year 5)
- layout (years 3/4, 5, and 7).

Editing phase

At the "editing phase", the year 5 and 7 students changed significantly more individual words when they used a pencil than when they used a word processor. In this phase, students of all year levels also made significantly more changes to layout when they used a word processor than when they used a pencil.

Re-crafting by phase

When students used a word processor, they made significantly more of their re-crafting changes at the "writing phase". When they used a pencil, they made significantly more of their re-crafting changes at the "editing phase".

It is interesting that the students did not make as many of their re-crafting changes at the "editing phase" when working on a word processor. There are two likely reasons for this. One is that students did more of their re-crafting as they typed their original draft, and so had less need to re-craft at the end. The other is that some students tended to think that spellcheck would find all their mistakes for them, and therefore when they got to the "editing phase", they were concerned only with removing the "squiggles", rather than reading through to check that their work made sense.

Differences in editing changes by year level

There were few variations in the type or amount of total editing changes made by the year 5 and 7 students. These students were, on the whole, concerned with accurate spelling, grammar, and the placement of full stops and capitals. In contrast, the year 3/4 students showed a different pattern from the older students. They were more focused on a smaller and simpler range of editing changes. They tended to make corrections to spelling and capitals, but were less likely to make corrections that involved other types of punctuation, or to re-craft words or sentences. Interestingly, no students at any of the three year levels attempted to make any editing changes involving question marks, although there were opportunities in their writing to do so.

Common types of editing changes

Some types of editing changes were common to at least half of the pieces of writing at all the year levels. These changes involved:

- spelling (year 3/4, 97%; year 5, 97%; year 7, 94%)
- capitals (year 3/4, 83%; year 5, 70%; year 7, 61%)
- grammar, for example, tense (year 3/4, 53%; year 5, 77%; year 7, 63%)
- individual words (year 3/4, 52%; year 5, 73%; year 7, 86%)
- layout, for example, spacing (year 3/4, 56%; year 5, 55%; year 7, 53%).

Other types of editing changes were commonly made at least once in each piece of work by the year 5 and 7 students, but not by the year 3/4 students:

- full stops (year 3/4, 44%; year 5, 72%; year 7, 64%)
- rewording sentences (year 3/4, 25%; year 5, 53%; year 7, 59%).

Less common types of editing changes

Other types of editing changes occurred on only some or on none of the writing samples. These changes involved:

- commas (year 3/4, 11%; year 5, 33%; year 7, 47%)
- speech marks (year 3/4, 11%; year 5, 28%; year 7, 23%)
- apostrophes (year 3/4, 11%; year 5, 18%; year 7, 25%)
- exclamation marks (year 3/4, 2%; year 5, 9%; year 7, 5%)
- inserting paragraph breaks (year 3/4, 3%; year 5, 5%; year 7, 9%)
- re-ordering sentences (year 3/4, 2%; year 5, 2%; year 7, 0%)
- re-ordering paragraphs (year 3/4, 0%; year 5, 2%; year 7, 2%)
- question marks (year 3/4, 0%; year 5, 0%; year 7, 0%).

Re-crafting

The most common re-crafting or deep editing feature observed was changing individual words to improve the quality of writing. On approximately half (46%) of the writing samples, students also reworded at least one sentence. Structural changes, such as inserting paragraph breaks, or re-ordering sentences or paragraphs, were made on only a very small number of writing samples at each year level. Students in lower year levels made on average significantly fewer re-crafting changes than their older counterparts (year 3/4, 2 changes; year 5, 3 changes; year 7, 4 changes).

Differences in editing changes by literacy level

The total number of editing changes made by students in the two literacy groups was similar; in the high literacy group, the average was 22 changes overall, and in the low literacy group, it was 19. Students in the high literacy group wrote significantly more words overall, made significantly more corrections to capitals, and were more likely to make re-crafting changes (3 changes) than students in the low literacy group (2 changes).

The differences between the two literacy groups was more pronounced for younger students. Along with the editing changes mentioned above, the year 3/4 students in the high literacy group also made significantly more changes to individual words, and significantly more editing changes overall, than those in the low group.

Differences in editing changes by gender

The girls in this study wrote significantly more words on average (134) than the boys (112). The total number of editing changes made by boys (19) and girls (22) was approximately the same, but the types of changes differed by gender. Girls were more likely than boys to make editing changes to grammar. Girls also made significantly more re-crafting changes on average (3) than boys did (2). There were no changes that boys made significantly more than girls did.

Time taken to complete tasks

When students used a word processor, they took longer to write approximately the same number of words than they did when they used a pencil. Students spent on average 28 minutes to write and edit when they used a word processor, and 19 minutes when they used a pencil. Students spent on average 24 minutes in the "writing phase" and 4 minutes in the "editing phase" when they used a word processor, and 14 minutes and 5 minutes respectively when they used a pencil.

Year 7 students spent significantly less time writing than younger students (year 7, 13 minutes; year 5, 21 minutes; year 3/4, 23 minutes). Year 7 students also spent significantly less time in the "editing phase" than year 3/4 students (year 7, 3 minutes; year 5, 4 minutes; year 3/4, 6 minutes). There were no significant differences by gender or literacy level.

Changes to spelling

Spelling changes were the most frequent editing changes made to the writing samples, with 97% of the year 3/4 and 5 samples and 94% of the year 7 samples including at least one spelling change. As the students were writing, data were collected to allow alterations to spelling to be analysed for:

- the total number of spelling changes
- how many words each student attempted to change more than once
- the maximum number of changes to any one word made by each student.

Students altered the spelling of more words when they used a word processor than when they used a pencil. This finding was significant for the year 5 and 7 students. The difference was more pronounced for the year 5 students, who made an average of 10 spelling changes when they used a word processor and 5 changes when they used a pencil. The figures for the year 7 students were 10 and 7 respectively. Although the year 3/4 students also made more spelling changes on average when they used a word processor (10), compared with when they used a pencil (7), this difference was not significant.

There were two main reasons for the larger number of spelling changes observed when students used a word processor. The first was related to the fact that some of the students' initial errors were "typos" caused by unfamiliarity with the keyboard. It is likely that the correcting of "typos" contributed to the larger number of spelling corrections made when using a word processor, particularly for the year 3/4 and 5 students, who had fewer keyboard skills.

The second reason for the larger amount of spelling changes was that students, using the prompts provided by the word processor, were motivated to remove the "squiggly lines" of spellcheck and get the word right. As one student stated:

> The red thing underlining it means it's a mistake so I did it [changed a word] so that I could be right not wrong. (Year 5)

When students used a pencil, only seven (22%) in year 3/4, two (6%) in year 5, and one (3%) in year 7 made more than one attempt to correct any given word. In contrast, when students used a word processor, they tended to persevere for longer, with 20 (63%) of the year 3/4, 17 (53%) of the year 5, and 21 (66%) of the year 7 students making more than one attempt to correct a mis-spelt word, for example:

war → wat → warter → water	(Year 3/4)
nobao → nobady → noboby → nobody	(Year 5)
prperly → porperly → properly	(Year 7)

Changes to spelling by literacy level and gender

When a word processor was used, students in the low literacy group made a similar number of spelling changes (11) to those in the high literacy group (9). But students in the low literacy group were more likely to make more than one try to correct each word and to persevere for longer in an attempt to get the word correct. This difference was not evident when a pencil was used.

There were no significant differences in the pattern of spelling changes by gender.

Use of spellcheck, dictionaries, and auto-correct

Spellcheck

Using spellcheck was a skill that showed clear progression from year 3/4 to year 7. Most students (year 3/4, 59%; year 5, 84%; year 7, 94%) noticeably used spellcheck and/or the grammarcheck "squiggles" to prompt them to change spelling, punctuation, or spacing errors. In addition, 15 (47%) of the year 5 and 22 (69%) of the year 7 students used the tool bar or right-click to access the spellcheck function for corrected spelling or grammar. Only 2 (6%) of the year 3/4 students used this more sophisticated function.

Although many of the year 3/4 and 5 students were prompted by the "squiggly" lines of spellcheck, most had only a superficial understanding of the function of these lines. Many of the year 3/4 and 5 students attempted to change the spelling of a word or substituted a word for a different one when a red squiggly line appeared, on the assumption that the word had been spelt incorrectly. In many of these cases, the prompt related to the student's failure to insert a space between two words or between a full stop and the next word, for example:

> So Rona went to the river to get some more water.It was dark... (Year 5)

Although half of the year 5 students made use of the tool bar or right-click spellcheck, many were confused about which option to select, or how to select it. This was not the case for the year 7 students, who were more aware of how to use spellcheck. This could be related to the fact that more of the year 7 teachers than teachers of the other year levels reported that they taught students skills, such as use of spellcheck, specifically for editing on a word processor.

Dictionaries

The year 5 and 7 students tended to view spellcheck as a replacement for a dictionary. Only 5 (16%) of the year 5 and 2 (6%) of the year 7 students used a dictionary when they were using a word processor. In contrast, the year 3/4 students were more likely than the older students to use a dictionary or *Spell-Write* when they used a word processor (13, 41%). When students used a pencil, significantly more of the year 5 (20, 63%) and the year 7 (13, 41%) students used a dictionary or *Spell-Write*, compared with when they used a word processor. Although slightly more of the year 3/4 students used a dictionary or *Spell-Write* when they used a pencil (19, 59%), compared with when they used a word processor (13, 41%), this difference was not significant.

Auto-correct

The auto-correct function of the word-processing package made automatic changes to the writing of 23 (72%) of the year 3/4, 22 (69%) of the year 5, and 26 (81%) of the year 7 students, for example, by changing "hte" to "the", or, if the student had pressed return, by inserting a capital at the start of a new line. This function was a mixed blessing for the year 3/4 and 5 students. They sometimes pressed return to get to the next line, rather than letting the word-processing package wrap the text around for them. This resulted in the start of each line being given a capital, which students then found difficult to remove, for example:

> . . . when kaka called" Kakariki come here
> "so kakariki came over. Then kaka said " you have ugly
> Feathers the other birds laugh at you'' Kakariki said"
> I like these feathers'' and flew off. And did loops in
> The air showing off his feathers. The next day he
> Was flying over the forest when kaka called him over
> To the branch that kaka was on . . . (Year 5)

This type of problem was less of a concern for the year 7 students who had, on the whole, developed more word-processing skills. The auto-correct function was more of an advantage for the year 7 students. For example, when asked why they did not put capitals at the start of sentences, a couple of students replied, "I knew auto-correct would do it for me."

Quality of students' writing samples

A number of measures were used to assess the overall quality of the writing samples to ascertain if there were any differences by mode of writing, gender, year level, or literacy level. These measures included a count of the total number of words written, a global assessment of the overall quality of the writing samples, and an assessment of each writing sample using scales for punctuation, grammar and syntax, and layout.

Word count

Word count by mode

The length (word count) of the writing samples produced with a word processor was not significantly different from that produced with a pencil. The year 3/4 students wrote an average of 78 words with a word processor, and 99 with a pencil. The average numbers of words written for the year 5 students were 123 and 126, and for the year 7 students 153 and 162, respectively.

Word count by year level and genre

Students wrote samples of different lengths depending on the type of task they were completing and their year level. At all year levels, students wrote significantly less when they were completing the instruction-writing tasks. Older students wrote significantly more than younger students. Year 3/4 students wrote an average of 57 words when they were completing the instruction-writing tasks, and 120 words when they were retelling a legend. The averages for the year 5 students were 81 and 168, and for the year 7 students, 107 and 208, respectively.

Word count by gender and literacy level

Students in the high literacy group wrote significantly more on average (147 words) than those in the low literacy group (100 words), and girls wrote significantly more (134 words) than boys (112 words).

Assessment of global quality

Using the global quality criteria, a comparison was made between the word-processed and pencil-written samples of each student. Although there was a trend for the pencil-written legends to be rated "better" than the word-processed ones, no significant difference between the quality of the word-processed and pencil-written samples was found overall, or by year level, gender, or literacy level. Table 2 shows the number of writing samples that were rated "better" by mode.

Table 2: Rating of Global Quality by Mode

	Task type									
	Rona and the Moon N = 24		Kakariki N = 24		Snakes and Ladders N = 24		Snap N = 24		Total N = 96	
Rating	N	*%*	N	*%*	N	*%*	N	*%*	N	*%*
Pencil-written better	15	*63*	13	*54*	9	*38*	10	*42*	47	*49*
Word-processed better	7	*29*	5	*21*	11	*46*	10	*42*	33	*34*
Not able to discriminate	2	*8*	6	*25*	4	*17*	4	*17*	16	*17*

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Punctuation, grammar and syntax, and layout

Each task was assessed using the punctuation scale and the grammar and syntax scale. In addition to these two scales, the instruction-writing tasks were also given a grade for layout features. Overall there were no significant differences in punctuation, grammar and syntax, or layout between the word-processed samples and the pencil-written samples. The average rating or grade for the punctuation, grammar and syntax, and layout measures was two for both writing modes.

There was one exception to this lack of significance. The word-processed writing samples of students in the high literacy group were given a lower rating, on average, on the grammar scale than the pencil-written samples.

Overall, girls were more likely to be given a higher punctuation rating than boys, and students in the high literacy group were more likely to be given a higher rating on all of the scales than those in the low literacy group. Table 3 shows the ratings for punctuation, grammar and syntax, and layout, by literacy level.

Table 3: Mean Rating of Punctuation, Grammar and Syntax, and Layout by Literacy Level

	Literacy level					
	Low			*High*		
Criteria	N	Mean	s.d.	N	Mean	s.d.
Punctuation	96	1.95	0.92	96	2.79	1.13
Grammar and syntax	96	1.91	0.87	96	2.70	1.03
Layout	48	1.19	1.44	48	2.23	1.32

Spelling and vocabulary measures

Five spelling and vocabulary counts were used to assess the quality of the writing samples. These measures were:

1. Running count
2. Dictionary count
3. Homophone count
4. Context count
5. Vocabulary count (words of seven letters or more)

Table 4 shows the mean spelling and vocabulary counts by mode of writing.

Table 4: Mean Spelling and Vocabulary Counts by Mode

	Mode					
	Word-processed			*Pencil-written*		
Measure	N	Mean	s.d.	N	Mean	s.d.
Running count	96	3.93	5.55	96	5.94	6.52
Dictionary count	96	3.06	4.08	96	4.66	4.98
Homophone count	96	0.40	0.67	96	0.36	0.63
Context count	96	0.83	1.53	96	0.81	1.39
Vocabulary count	96	5.78	4.64	96	6.02	4.49

Spelling

Word-processed writing samples had significantly fewer overall spelling mistakes (as measured by the running and dictionary counts) than the pencil-written samples. There were fewer spelling mistakes in the word-processed writing samples of students of both literacy groups, both genders, and all year levels, compared with the pencil-written samples. But the relationship between spelling mistakes and mode of writing was only significant for students in the high literacy group, for boys, and for year 7 students, indicating that these students got more benefit from using the spellcheck functions than the other students did.

The year 7 students had a significantly lower running count and dictionary count than the year 3/4 and 5 students, and a significantly lower context count than the year 3/4 students.

Vocabulary

Overall, there was no difference in the vocabulary count of the word-processed and the pencil-written samples. Students used, on average, six words of seven or more letters no matter what mode of writing they used.

The writing samples of students in the high literacy group had a higher vocabulary count (8) than the samples of students in the low literacy group (4). There was no significant difference between the vocabulary count of boys and girls.

As the year level of students increased, students used significantly more words of seven letters or more. The year 3/4 students had a vocabulary count of four words, year 5 students had six, and year 7 students had eight.

Students' keyboard skills

As students were observed completing the word-processing tasks, their keyboard skills were rated on a scale of 1 to 3. A rating of 1 indicated that students had difficulty finding their way around the keyboard, while a rating of 3 indicated that they could use the keyboard quickly and easily. As Table 5 shows, the rating of students' computer skills moved significantly higher as the year level increased.

Table 5: Rating of Students' Computer Skills by Year Level

	Year 3/4 N = 32		Year 5 N = 32		Year 7 N = 32		Total N = 96	
Skill rating	N	*%*	N	*%*	N	*%*	N	*%*
Low (1)	17	*53*	11	*34*	-	-	28	*29*
Middle (2)	14	*44*	13	*41*	16	*50*	43	*45*
High (3)	1	*3*	8	*25*	16	*50*	25	*26*

For younger students, computer literacy was related to general literacy, as measured by PAT scores. The year 3/4 and 5 students in the high literacy group were more likely to receive higher computer skills ratings than students in the low literacy group. This difference was not found for the year 7 students. There were no significant differences between the ratings given to boys and girls.

Student perspectives

Students were interviewed about their attitudes to writing, and their proof-reading and editing processes. The findings from these interviews are outlined below.

Students' attitudes to writing

Students' attitudes to writing varied, depending on their age, gender, and literacy levels. Significantly more of the year 3/4 and 5 students than of the year 7 students had positive views about writing, as Table 6 shows. Girls were more likely to say they liked writing "a lot" (23, 48%) than boys (6, 13%). Students in the low literacy group were more likely to say that they did "not much" or "not much at all" like writing (14, 29%) than those in the high literacy group (5, 10%).

Table 6: Students' Attitudes to Writing by Year Level

	Year 3/4 N = 32		Year 5 N = 32		Year 7 N = 32		Total N = 32	
Do you like writing?	N	*%*	N	*%*	N	*%*	N	*%*
A lot	15	*47*	10	*31*	4	*13*	29	*30*
A bit	5	*16*	13	*41*	9	*28*	27	*28*
Middle	4	*13*	6	*19*	11	*34*	21	*22*
Not much	4	*13*	2	*6*	7	*22*	13	*14*
Not much at all	4	*13*	1	*3*	1	*3*	6	*6*

Students' attitudes to writing with a computer did not show as much variability as their attitudes to writing in general. On the whole students expressed positive viewpoints about writing with a computer, as Table 7 shows.

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Table 7: Students' Attitudes to Writing with a Computer by Year Level

	Year 3/4 N = 32		Year 5 N = 32		Year 7 N = 32		Total N = 96	
Do you like writing with a computer?	N	*%*	N	*%*	N	*%*	N	*%*
A lot	13	*41*	9	*28*	7	*22*	29	*30*
A bit	4	*13*	15	*47*	12	*38*	31	*32*
Middle	7	*22*	6	*19*	10	*31*	23	*24*
Not much	6	*19*	1	*3*	2	*6*	9	*9*
Not much at all	2	*6*	-	-	1	*3*	3	*3*
Not used a computer for writing	-	-	1	*3*	-	-	1	*1*

There were some differences between students' attitudes to writing in general and writing with a computer. Students from the low literacy group were significantly more likely to say that they were neutral or liked writing with a computer (42, 89%), compared with writing in general (34, 71%). A similar trend was evident for year 7 students. Although girls were more likely to say they liked writing in general "a lot" compared with boys, there was no significant difference between boys' and girls' viewpoints about writing with a computer. Given this information, it is likely that computers could be used as a motivational tool for the students who viewed writing with a computer more positively than writing in general, that is, low literacy students, boys who do not like writing, and older students.

Approximately half of the students thought that it was easier to write using a pencil than with a computer. Approximately one-third thought that writing with a computer was easier. A small proportion thought it was the same. There were no differences by year level, gender, or literacy level.

When students were asked about what was better about writing with a pencil, the most common reply, given by two-thirds (66, 69%) was that it was easier or quicker to use a pencil, for example:

> You can write bigger stories faster. (Year 5)
>
> You can write down everything you are thinking. (Year 7)

When they were asked what was better about writing with a computer, older students gave a range of responses. The four most common were that:

- spellcheck helped find spelling mistakes (year 5, 41%; year 7, 31%)
- writing looked neater (year 5, 31%; year 7, 47%)
- tools could be used, for example, different fonts (year 5, 25%; year 7, 38%)
- it was easier or faster to write (year 5, 19%; year 7, 28%).

Two examples of students' comments were:

> The computer can show you your editing you need to do by underlining it.
> You can get the letters in different sizes. (Year 5)

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Nicer than your own writing, faster, you can add pictures from clipart. (Year 7)

Younger students tended to report one main thing that was better about writing with a computer, that is, that it was easier or faster to write (year 3/4, 41%), for example:

You don't have to hold a pencil; your wrist doesn't get sore. (Year 3/4)

Students' descriptions of their editing processes

When students were asked to describe how they proof-read and edited their work, nearly all mentioned that they proof-read for spelling mistakes and checked their spelling with the help of a dictionary (Table 8). Fewer students mentioned that they checked to make sure their writing made sense, re-crafted their work, or proof-read for punctuation mistakes. The types of editing least mentioned by students involved structural changes, such as re-ordering sentences or inserting paragraph breaks. The majority of students also mentioned that their teacher assisted them with the editing process in some way.

Table 8: Students' Descriptions of their Editing Processes by Year Level

	Year 3/4 N = 32		Year 5 N = 32		Year 7 N = 32		Total N = 96	
Editing and proofing process	N	*%*	N	*%*	N	*%*	N	*%*
Checks for spelling mistakes	32	*100*	30	*94*	30	*94*	92	*96*
Checks spelling in dictionary	26	*81*	26	*81*	23	*72*	75	*78*
Checks spelling by self	7	*22*	6	*19*	7	*22*	20	*21*
Checks basic punctuation	15	*47*	10	*31*	21	*66*	46	*48*
Checks complex punctuation	3	*9*	1	*3*	7	*22*	11	*11*
Checks for sense	9	*28*	13	*41*	17	*53*	39	*41*
Re-crafts words or sentences	7	*22*	10	*31*	9	*28*	26	*27*
Re-orders sentences	-	-	1	*3*	1	*3*	2	*2*
Inserts paragraph breaks	-	-	1	*3*	5	*16*	6	*6*
Peer checks work	1	*3*	5	*16*	8	*25*	14	*15*

There were no significant differences in the types of processes mentioned by students of different year levels or genders. Students in the high literacy group were more likely to report that they checked their work for sense and re-crafted than were students in the low literacy group. Some descriptions of students' editing and proof-reading processes were:

If something is wrong I don't always need to use the dictionary. I can spell the word above. I check for capitals. . . Sometimes if things look a bit silly I change them for a different word. [What sort of things could look "silly"?] If something doesn't sound or look right. Sometimes it sounds boring; like "bad dog" I could change it to "very naughty dog". (Year 3/4)

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I use the dictionary to fix words, then I show it to the teacher. (Year 3/4)

I read through it again to see if I have written it too quickly and missed out a letter or put in wrong spelling or if there are better words – maybe I can find a better word. I look up spelling words in the dictionary. I put full stops, capital letters, and punctuation in if I have forgotten them. (Year 5)

I read it, and give it to the teacher and the teacher fixes the mistakes. (Year 5)

First I look for words that are not right. . . I check it to make sure it makes sense. . . I check speech marks, commas, and apostrophes. If I had a stupid sentence I would elaborate more. (Year 7)

I read over it. I find spelling words in the dictionary. I check for commas and capital letters, etc. (Year 7)

Editing using a computer

The older students were more likely to state that when they used a computer, they proof-read and edited in a different way from when they used a pencil. A total of 84% of year 5 students and 81% of year 7 said this, compared with only 19 (59%) of year 3/4 students. There were no differences by gender or literacy level.

Approximately half of the year 3/4 and 5 students and three-quarters of the year 7 students said that they found proof-reading and editing their work easier when they used a computer. Eight of the year 3/4, three of the year 5, and two of the year 7 students found it harder, and the rest thought that it was about the same. The main reason given by students of all year levels for editing in a different way and/or finding editing easier when they used a computer was the availability of spellcheck, which allowed them to identify or change mis-spelt words.

Students' use of computers for writing

Most students reported that they used computers for writing both at school (year 3/4, 75%; year 5, 84%; year 7, 100%) and at home (year 3/4, 78%; year 5, 81%; year 7, 69%). Most (year 3/4, 94%; year 5, 91%; year 7, 81%) had a home computer. There was no significant difference in the pattern of home computer ownership by year level, gender, or literacy level.

Approximately two-thirds of the students reported that they had first used a computer at home. Girls, and students in the low literacy group, were more likely than the other students to state that they had first used a computer at home.

A small number of students (year 3/4, 9%; year 5, 22%; year 7, 31%), reported that they used a school computer for writing on a weekly basis. The other students reported that they used school computers less frequently, that is, once a month or less. Older students (year 5 and 7) reported more frequent use of school computers for writing than the year 3/4 students. Students in the high literacy group also reported more frequent use of school computers than their counterparts in the low literacy group. There were no gender differences in the reported frequency of school computer use.

The types of writing for which students used a computer at school included stories, arguments, articles, projects, letters, and e-mails. Most students reported that they usually used the computer for publishing, but would occasionally write a draft on the computer.

Regardless of year level, gender, or literacy level, students used home computers significantly more frequently than school computers for writing. Half of both the year 5 and 7 students and over one-third of the year 3/4 students reported that they made weekly use of a home computer for writing. Students in the high literacy group used home computers significantly more frequently than students in the low literacy group. Students reported a range of writing activities carried out at home, including homework, lists, projects, diaries, letters, e-mails, stories, poems, cards, plays, and recipes.

Students' computer skills

Students were asked about their keyboard skills; their responses are shown in Table 9. As the year level increased, students reported more skills. The year 7 students were significantly more likely than the year 3/4 students to report that they knew how to use the spellcheck function and how to cut and paste.

Table 9: Students' Descriptions of their Keyboard Skills by Year Level

	Year 3/4 N = 32		Year 5 N = 32		Year 7 N = 32		Total N = 96	
Keyboard skills	N	*%*	N	*%*	N	*%*	N	*%*
Get rid of, or delete, words	32	*100*	31	*97*	32	*100*	95	*99*
Put letters in capitals	29	*91*	32	*100*	32	*100*	93	*97*
Add full stops	29	*91*	31	*97*	32	*100*	92	*96*
Add commas	28	*88*	29	*91*	32	*100*	89	*93*
Change letter (font) size	25	*78*	29	*91*	32	*100*	86	*90*
Add speech marks	24	*75*	28	*88*	31	*97*	83	*86*
Add apostrophes	23	*72*	27	*84*	30	*94*	80	*83*
Make paragraphs	23	*72*	25	*78*	31	*97*	79	*82*
Use spellcheck	12	*38*	26	*81*	30	*94*	68	*71*
Move sentences (cut and paste)	12	*38*	25	*78*	24	*75*	61	*64*

Students in the low literacy group reported fewer skills than their counterparts in the high literacy group. Students in the low literacy group were less likely to report that they knew how to insert speech marks and apostrophes, or that they knew how to use spellcheck. Girls and boys reported similar keyboard skills.

Interestingly, although a large proportion of students reported being able to cut and paste, only one student (year 5) was observed using this facility. Most students were observed deleting words, and many were observed using spellcheck, either in its simpler form (using the "squiggles" as a prompt (79%)) or its more complex form (using the tool bar and/or right-click spellcheck (41%)).

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Teacher Perspectives

This section of this report summarises the information gained from interviews with 21 teachers. The teachers interviewed had teaching experience that ranged from less than one year to over 30 years.

Features of the writing process

As a means of identifying the role played by editing and proof-reading in the wider writing process, teachers were asked to describe the writing process followed by students in their classes. All of the teachers interviewed taught a similar general process, as indicated by the italicised headings in Figure 1. Slight variations were reported, and these are described below each heading.

Figure 1: The Writing Process

1. The teacher introduces the writing activity

Introductory or pre-writing activities reported by teachers included discussing the purpose for writing, looking at topic related pictures or objects, drama, music, carrying out library research, reading and analysing models of the genre, identifying features of the genre, teacher modelling, and brainstorming. Several teachers noted that their choice of introductory/pre-writing activities was dependent on genre. Several teachers reported planning activities for their class reading programme to support and provide models for the class writing programme.

↓

2. The students plan their writing

Teachers reported a variety of ways in which students planned their writing, including sequential outlines, flow charts, brainstorms, and webs. One teacher reported teaching his students to use software to plan the structure of their writing. Some teachers reported that their students planned as a whole class or in groups, while others reported that students planned on an individual basis.

↓

3. The students begin writing their draft

Most teachers interviewed indicated that students began writing a first draft individually. One teacher reported that students drafted in pairs or groups as well as on an individual basis. Approximately one-quarter of the teachers interviewed reported that they spent some time at this stage offering support to those students who found it difficult to get started with their draft.

↓

4. The teacher initiates breaks in the drafting process

Approximately half of the teachers said that they stopped students one or more times during the drafting process to provide further input, a chance for students to share their work with peers, and/or opportunities for children to edit and proof-read the work that had been written so far.

↓

5. On completion of the draft, the students give their work a final edit and proof-read

When asked about what students did at the proof-reading and editing stage, teachers reported a range of things, such as: reading the draft to ensure it made sense, correcting punctuation errors, correcting spelling errors with the help of a dictionary or *Spell-Write*, and various forms of re-crafting, such as changing words or inserting adjectives to make the writing more interesting. Teachers reported teaching students a range of methods for identifying and correcting errors such as underlining words, or using a different coloured pen. Approximately one-third of the teachers reported that students carried out their editing and proof-reading with the help of a peer as well as on their own. Several teachers noted that spelling errors in students' writing were fed back into the spelling programme.

↓

6. The teacher makes corrections to the student's work or identifies errors for the student to correct

Approximately two-thirds of the teachers reported correcting students' errors and/or providing written feedback to students at this stage of the process. A few teachers said they had organised a set conferencing time in the programme specifically for providing feedback to students about their work and for related teaching. A few others said they provided oral feedback on an incidental basis.

↓

7. The student publishes the piece of work

Most teachers reported that the writing process ends with students publishing their work. Approximately one-third stated that students did not always publish their drafts. One teacher reported that a discussion about presentation and layout occurred at this stage.

The role of word processors in the classroom writing programme

Word processors and the writing process

Most teachers of students at years 3/4 and 5 reported that the classroom word processor was used either exclusively or mainly for publishing work. With the exception of writing labels, titles, or e-mails, the process of drafting, editing, and proof-reading was not done on a word processor. Several teachers indicated that the reason a word processor was only used for publishing was the lack of availability of computers. As one teacher said:

> It's a fairness thing. Everyone needs a turn. That's why the time on the computer is largely for publishing. [With] only one computer per class it's hard to get the kids through. (Year 3 teacher)

In contrast with the teachers of year 3/4 and 5, half of the teachers of the year 7 students reported that the classroom computer was used for both drafting and publishing written work. All of the teachers who reported student use of the computer for drafting as well as publishing said that the students followed the same writing process when they worked on the computer as they did when using a pencil.

Frequency of use of word processors

Approximately two-thirds of the teachers of year 3/4 or 5 students said that students used a word processor once a month or less. The teachers of year 7 reported a higher rate of usage, with most teachers stating that students used a word processor at least once a week. Approximately half of the teachers interviewed referred to the problems associated with not having enough word processors.

Types of writing for which a word processor was used

When asked about the types of writing for which the classroom word processor was used, teachers reported a range of genres, including poetry, narratives, re-tellings, articles, reports, posters, brochures, menus, title pages, homework, and e-mail letters. The genre that most teachers mentioned was poetry. Just under one-quarter of the teachers commented on the usefulness of using a word processor for publishing poetry, because of the ability to work with layout possibilities. One teacher described it as "brilliant because they can centre, and change font style and size."

Over one-quarter of the teachers interviewed commented on the need to choose "quick" tasks to be done on a word processor, so that all students could have a turn. Poetry was cited as an example of such a task. This view was emphasised by one teacher, who said she tried to "steer clear of lengthy stories".

Keyboard skills

Just over half of the teachers of year 3/4 students referred to problems associated with students' lack of keyboard skills. In contrast, only one teacher of the year 5 students and one teacher of the year 7 students focused on lack of keyboard skills as a problem. This problem was summed up by one teacher who said:

> I think some students with low computer skills miss out on some creative thinking because it takes so long and the technology gets in the way. (Year 7 teacher)

Teaching editing skills

Teacher expectations of editing skills

One of the aims of this study was to compare the editing and proof-reading skills of students of differing literacy levels. Teachers were asked to outline their expectations of average, above average, and below average students, at the class level they were teaching, in terms of their editing and proof-reading skills. Expectations mentioned by at least half of the teachers at each level are summarised in Figure 2.

Figure 2: Teacher Expectations of the Editing Skills of Students by Year and Literacy Level

Year 3/4 Below Average	*Year 3/4 Average*	*Year 3/4 Above Average*
• Check the writing makes sense with teacher support. • Ensure the use of full stops and capitals is correct with teacher support. • Identify some spelling errors in common/high frequency words and correct these with teacher support. • Use word lists or junior dictionaries (pre *Spell-Write*).	• Check the writing makes sense. • Ensure the use of full stops and capitals is correct. • Identify spelling errors in common/high frequency words and correct some of these. • Use a junior (pre *Spell-Write*) dictionary. • Re-craft words with teacher support.	• Check the writing makes sense. • Ensure the use of full stops and capitals is correct. • Begin to correct more sophisticated types of punctuation such as speech marks and commas. • Correct most spelling errors. • Use *Spell-Write* independently. • Re-craft words.
Year 5 Below Average	*Year 5 Average*	*Year 5 Above Average*
• Ensure the use of full stops and capitals is correct. • Identify spelling errors in common/high frequency words and correct these with teacher support. • Use word lists or junior dictionaries (pre *Spell-Write*) and *Spell-Write* with teacher support.	• Ensure the use of full stops and capitals is correct. • Identify spelling errors in common/high frequency words and correct these. • Use *Spell-Write* independently and dictionaries with increasing independence. • Re-craft words with teacher support.	• Ensure the use of full stops, capitals, and more sophisticated types of punctuation, such as speech marks and commas, is correct. • Use dictionaries independently to correct spelling errors. • Re-craft words. • Re-craft sentences.
Year 7 Below Average	*Year 7 Average*	*Year 7 Above Average*
• Ensure the use of full stops and capitals is correct. • Identify spelling errors in common/high frequency words and correct these with teacher support. • Use dictionaries with teacher support. • Insert paragraph breaks with teacher support.	• Ensure the use of full stops, capitals and more sophisticated types of punctuation are correct. • Identify spelling errors in common/high frequency words and correct these. • Use dictionaries independently. • Use a thesaurus with teacher support. • Re-craft words. • Re-craft sentences with teacher support. • Insert paragraph breaks with teacher support.	• Ensure the use of full stops, capitals, and more sophisticated types of punctuation is correct. • Use dictionaries independently to correct spelling errors. • Use a thesaurus independently. • Re-craft words. • Re-craft sentences. • Re-order sentences. • Insert paragraph breaks.

How teachers taught editing skills

When asked about how they taught editing and proof-reading skills, most teachers described a process whereby they identified errors or areas for improvement in a student's work and then informed the student of these, mainly through written feedback and sometimes through discussion. In addition, most teachers reported taking more formal lessons at class or group level. When describing the content of these lessons, teachers covered a range of skills, including re-reading a piece of work to ensure it made sense, identifying and correcting spelling errors, using a dictionary, the correct use of punctuation, organising ideas into paragraphs, structuring sentences, grammar and spelling exercises, re-crafting, using a thesaurus, and sentence enrichment. In some cases the focus of these lessons was on writing skills, which inform a student's ability to proof-read and edit, but differ from the skills of actually carrying out the proof-reading and editing.

Formal assessment of editing skills

Most teachers said they carried out formal assessment of students' proof-reading and editing skills. The range of assessment approaches reported by these teachers included: the assessment of student writing samples against set criteria; the use of anecdotal notes based on student observations and writing samples; and the use of exercises requiring students to proof-read a passage of writing with a variety of errors embedded in it.

Editing skills taught for use on a word processor

Just over half of the year 3/4 teachers, less than a third of the year 5 teachers, and nearly all of the year 7 teachers reported teaching students skills specifically for editing and proof-reading their work on a word processor.

Of those teachers who did not teach these skills, several believed that the children already had the necessary skills. This view was summed up by one teacher, who said that the word-processing skills learnt by students at home "far outweigh the skills learnt at school".

Of those teachers who stated that they did teach students skills for editing and proof-reading on a word processor, most reported that this teaching was carried out incidentally on an individual basis, as the need arose. Just over a third of these teachers said that they made use of peer tutoring to assist with this teaching. The skills these teachers reported teaching to their students are summarised in Figure 3.

Figure 3: Skills Taught for Editing on a Word Processor by Year Level

Year 3/4	Year 5	Year 7
• Space bar • Enter (to go on to new line) • Delete • Cut and paste • Spellcheck • *Arrow keys and mouse to move around text* • *Shift key* • *That there is automatic run-on when you reach the end of a line*	• Delete • Cut and paste • Spellcheck • Arrow keys and mouse to move around text • Font size and style	• Spellcheck • *Grammarcheck* • *Thesaurus* • *Spacing* • *Bullet points*

Note: Skills mentioned by less than half of those teachers who reported teaching skills for editing and proof-reading on a word processor are written in italics.

Students ' editing when using a word processor

Teachers had a range of views about the quality of students' editing and proof-reading when using a word processor. Approximately one-third of the teachers believed that the use of a word processor made no difference to the quality of students' editing and proof-reading, or had not formed an opinion either way. Some teachers argued that the quality of editing and proof-reading was the result of student attitude, rather than the writing tool used.

However, the majority of teachers believed that the quality of students' editing and proof-reading was influenced by the use of a word processor. Approximately one-third of these teachers said that the quality of students' editing and proof-reading was *better* when they used a word processor. Reasons given for this viewpoint included the perceptions that:

- it was easier for children to find errors in their work on a word processor screen:

  > The clarity of text on screen makes it easier to see. (Year 5 teacher)

- the use of spellcheck resulted in fewer spelling errors:

  > It's good for the below average students because they can get their spelling correct. (Year 7 teacher)

- editing and proof-reading were quicker on a word processor:

  > Kids who use the computer who have keyboard speed – it saves them time and they enjoy reworking. (Year 7 teacher)

- students were more motivated to edit because they could insert or re-arrange text without having to do a lot of re-writing:

> Writing is better on the computer because it's easy to move things around. [Students are] reluctant when they have to re-write with pencil and are less likely to re-craft. (Year 7 teacher)

- students were motivated to ensure their work was of a high standard because they were using a word processor to produce their final published copy:

> They make a better job on the computer...because it's the published version they are working on so it has to be right. (Year 3/4 teacher)

- students were more motivated to proof-read and edit on a word processor because it was neater:

> It's good for the below average students because...their writing is neat. (Year 7 teacher)

By contrast, approximately two-thirds of those teachers who thought that the use of a word processor influenced students' writing said that the quality of editing and proof-reading was *worse* when students worked on a word processor. Reasons given for this viewpoint included the perceptions that:

- students had difficulty seeing errors on a word processor screen, and of editing on screen:

> They do a better job on their own writing because it's hard to see errors on a computer screen unless they print out a hard copy to edit on. (Year 5 teacher)

- fluency was hindered by the mechanics of typing:

> They are more fluent with a pencil. The mechanics of typing gets in the way of, and slows down the flow of ideas. (Year 5 teacher)

- the extra time needed to type had adverse effects on students' concentration and motivation:

> They get tired and lose motivation because it takes so long. (Year 4 teacher)

- there was no record of changes made:

> They don't make connections to what they've previously done as well. They don't improve things as well because they can't remember, or go back to, what they've deleted. You can't see the progress you've made like you can with a pencil draft. (Year 7 teacher)

- students forgot to add punctuation when working on a word processor:

> They forget to put in full stops and capitals and they don't notice...They know how to use capitals but they don't on the computer. (Year 3/4 teacher)

- students accepted words offered by spellcheck without checking that the words they accepted were the ones they really wanted:

> They take for granted the spellcheck and don't check which word they need. (Year 4 teacher)

- students assumed a word processor would fix all their errors and so did not re-read their work to check that it made sense:

> They think the computer will fix all their errors. (Year 7 teacher)

- students forgot the editing and proof-reading stages of the writing process when writing on a word processor, because they were working in a different context from the one they were accustomed to:

> They're out of the writing process. On the computer they just get to the end and print it off. Because they're not using a pencil they forget the writing process – they don't plan, they don't proof-read. (Year 7 teacher)

Summary

Editing patterns

All students made at least some editing changes to their work. The average number of changes was relatively constant across all the year groups. Students made more editing changes on average when they worked on a word processor than when they worked with a pencil, even when many of the changes that could be classified as "typos" were taken out of the count.

Year 5 and 7 students were, on the whole, concerned with accurate spelling, grammar, and the placement of full stops and capitals. The year 3/4 students were more focused on a smaller and simpler range of editing changes. They tended to make corrections to spelling and capitals, but were less likely to make corrections that involved other types of punctuation, or to make deep editing changes such as re-crafting words or sentences.

The majority of students made at least some use of either spellcheck "squiggles" or the more sophisticated functions of spellcheck when they were writing. Older students tended to use spellcheck as a replacement for a dictionary. Interestingly, although most students used spellcheck, most were not formally taught how to do so at school. The teachers in this study reported that many students learnt these skills at home.

The editing skills and processes that students talked about when they were interviewed corresponded to the skills and processes used when they were observed.

Patterns by mode of writing

When students used a word processor, they took longer to complete the same task but wrote approximately the same amount. There were some differences in the way students edited their work according to writing mode. Students were more likely to edit "as they went" when they used a word processor, and edit "at the end" when they used a pencil.

The fact that students tended to make most of their editing changes "as they went" when using a word processor is consistent with the findings in the literature as summarised by Snyder (1990) and Joram *et al.* (1992). Concerns have been expressed about this phenomenon (Joram *et al.* 1992). The literature on the place of revision within the writing process indicates that surface level revision is best carried out after the initial composing phase (Graves, 1983; Ministry of Education, 1992).

The quality of students' writing samples was compared using a number of different measures. On the whole, the types of editing changes made by students were similar and the overall quality of the work produced did not differ by writing mode. There was one main exception to this: when students used a word processor, they made more corrections to spelling with the assistance of spellcheck, and their writing samples had fewer spelling mistakes on average, compared with when they used a pencil.

MacArthur *et al.* (1996) stated that one problem of spellcheckers is that students may have difficulty identifying the word they require from the list of possibilities, and therefore may select correctly spelt but inaccurate words. It is possible that students, in their desire to remove the "squiggles" of spellcheck, could have accepted any correctly spelt but inaccurately used word, for example, clod instead of cloud. If students were having this difficulty, then a higher homophone or context count would be expected for the writing samples that were word-processed. This was not the case, indicating that students had no more difficulty finding an accurate word when they used a word processor than when they used a dictionary, *Spell-Write*, and/or their own knowledge.

The motivational effects of the use of computers and spellcheckers

Most students spent significantly longer writing with a word processor than with a pencil. Their willingness to persevere with the writing tasks, combined with the positive attitudes many students reported towards writing when using a computer, suggested that working on the computer was a motivating factor. The motivational aspect of computer use has been reported in international research (Watson, 1993; Shears, 1995; Rowe, 1993).

Some groups of students, particularly those in the low literacy group, reported significantly more positive attitudes towards writing with a computer compared with writing by hand, and over half of the students in this study stated that they found editing using a computer easier than editing by hand. The main reason they gave for this difference was the availability of spellcheck.

Like the study by Flockton and Crooks (1999), this study found that while the amount of editing completed by students when using different modes was approximately

the same, more students reported liking the task of editing their work with a word processor than with a pencil.

In this study, when students used a word processor they made fewer spelling mistakes. This was especially the case for students in the high literacy group, boys, and year 7 students. Having access to a spellcheck function in a word-processing package assisted these students to correct their spelling, either by prompting them to change words which had "squiggles" underneath them, or by providing a range of alternative spellings when the right-click or tool bar spellcheck was selected. When they used a word processor, students persevered in changing the spelling of words, with many trying more than once to remove spellcheck "squiggles". This was not the case when they used a pencil.

Patterns by year level

Older students wrote more, and completed the writing tasks more quickly, than their younger counterparts. Year 7 students reported, and were observed to have, a higher level of keyboard skill than the younger students. They were more likely than their younger counterparts to use the more sophisticated functions of spellcheck. Year 5 and 7 students edited their work in a similar way, although the year 7 students were more likely to make re-crafting changes than the year 5 students were. Year 3/4 students were focused on a simpler set of editing skills and processes than their older counterparts. They were less likely to edit for deep features. Year 3/4 students reported that they used computers less frequently at school than their older counterparts. They also reported more positive views about writing in general than the year 7 students. Students of all year levels reported that they used home computers more frequently than school computers.

Patterns by literacy level

Students in the low literacy group reported more positive attitudes towards writing with a computer than towards writing in general, when compared with students in the high literacy group. Therefore it is likely that computers could be used as a motivational tool for students with low literacy levels. Unfortunately, this did not seem to be the case, as students in the low literacy group reported that they used school computers less frequently than their counterparts in the high literacy group.

Students with low literacy levels reported having fewer keyboard skills than students with high literacy levels reported having. This difference was observed for students in years 3/4 and 5, but was not evident for the year 7 students. It is possible that this difference in keyboard skills could be linked to the fact that the students with low literacy levels reported a lower rate of usage of school computers, and so had less opportunity to develop these skills, than students with high literacy levels.

Students with high literacy levels produced samples of writing of a higher quality than students with low literacy levels no matter what mode of writing they used. Students in the high literacy group gained a higher rating on all of the quality measures used, had fewer spelling errors, and used a larger number of longer words, than students in the low literacy group.

Patterns by gender

In this study, the differences by gender that were evident were in the girls' favour. The girls wrote more, re-crafted more, and were more likely to be positive about writing in general than the boys. This finding is consistent with other research findings in New Zealand and overseas that show gender differences in literacy development to be in girls' favour (Ministry of Education, 2000).

Boys and girls held similar opinions about writing on a computer, but boys were less positive about writing in general, indicating that computers could be used as a motivational tool for boys who are disengaged from writing.

This study showed no significant difference between the keyboard skills of boys and girls. In contrast to studies such Pelgrum *et al.* (1993) and Crooks and Flockton (1997), this study did not find any gender differences in the reported frequency of computer use, either at school or at home. It should be noted however that this study only focused on the use of computers for the purposes of writing.

Incorporating the use of word processors into the writing process

Overall, the writing process followed by students was similar across the classes of all the teachers interviewed. Proof-reading and editing had an established and recognised place in this process. Most teachers had similar expectations of the editing and proof-reading skills of students at each year level.

While a word processor was used for writing in all classrooms, in many it was mainly, and in some cases exclusively, used for the purpose of publishing work. Teachers were conscious of the fact that their classroom had only one computer, and of the need for all students to have a turn. Taking a piece of writing from drafting through to publishing is time consuming, and this may explain why few teachers use a word processor in this way. If students are to use a word processor for the whole of the writing process, have the opportunity to use its tools, and make use of the editing possibilities provided by cut and paste, then clearly computers need to be more widely available in classrooms.

Most teachers reported that they did not teach students specific skills for using a word processor when editing and proof-reading. Several voiced the opinion that students already had these skills. However, observations of students writing on a word processor revealed that some did not know how to use tools such as spellcheck, while others had only a superficial understanding of how to use them. If students are to use a word processor for drafting, editing, and proof-reading, they would benefit from being taught these skills.

Implications for teaching

The students in this study displayed a variety of editing skills, ranging from being able to correct surface features, such as full stops and capitals, to being able to re-craft sentences. The information gained from this study has a number of implications for the teaching of writing and editing skills. This information indicates that the next learning steps for the year 3/4 students could include:

- postponing the editing of surface features, such as spelling errors, until after the initial composing phase.
- developing basic keyboard skills, for example, how to delete words, how to insert and edit capitals, full stops, other simple types of punctuation, and tips such as not using the return key at the end of each line or sentence.
- how to re-craft their work, for example by altering individual words or rewording sentences.
- how to proof-read their work for changes needed beyond capitals and spelling, for example, to look for places that require full stops, exclamation marks, commas, question marks, and speech marks.
- using the red or green "squiggly" lines of spellcheck accurately. Students could be taught about the meaning of the lines and some of the common reasons that they appear, for example, incorrect spelling, use of Maori or other words or names which are not in the spellcheck dictionary, lack of space or too much space between words, lack of capitals after full stops, and lack of a space between a full stop and the start of the next sentence.

The next learning steps for the year 5 students could include:

- postponing the editing of surface features, such as spelling errors, until after the initial composing phase.
- further development of basic keyboard skills, for example, simple ways to edit or delete words, and tips such as not using return at the end of each line or sentence.
- how to re-craft their work by making changes to individual words or sentences.
- how to use paragraph breaks.
- how to make structural changes to their work, such as re-ordering sentences.
- how to proof-read their work for a wider range of punctuation, for example, exclamation marks, commas, apostrophes, question marks, and speech marks.
- using spellcheck accurately and understanding its different functions, for example, having an understanding that extends beyond "red lines are for spelling and green lines are for grammar". Students could be taught how to use the right-click or tool bar spellcheck function, and the range of common reasons as to why red or green "squiggly" lines appear.

On the whole, the year 7 students, unlike the year 3/4 and 5 students, appeared to have mastered many basic word-processing skills, and therefore the next steps for students in this age group could include:

- postponing the editing of surface features, such as spelling errors, until after the initial composing phase.
- further re-crafting their work by making changes to sentences as well as individual words.
- using paragraphs.
- making structural changes, such as re-ordering sentences and paragraphs, by using functions such as cut and paste.

- using the right-click or tool bar spellcheck function.
- understanding the meaning of the green "squiggly lines" (grammarcheck).
- refining the use of punctuation needed for direct speech, for example, a new line for a new speaker, commas, and question marks.

CONCLUSIONS

Editing is one of the ways in which students learn the conventions of writing and develop strategies for improving the content of their work. This study showed that using a word processor can provide motivation for students with low literacy levels, and that using a word-processing package can help students to identify and correct spelling mistakes.

The fact that there were no significant differences overall in the quality of the writing samples produced on a word processor, apart from the number of spelling errors, could be due to a number of factors. One is that the writing tool used has little effect on the writing product. Another, and perhaps more likely, explanation is that the students in this study were not formally taught how to use a word processor for the purposes of editing, did not have sufficient opportunities at school to practise any editing skills they had developed, and did not follow the practice of delaying surface level revision until after the initial composing phase. It is possible that, if the students had been given these opportunities, or engaged in these practices, differences in the quality of their work may have been evident.

The publication *Dancing with the Pen* (Ministry of Education, 1992, pp. 123-124) describes how word processors can be used for drafting, revising, and publishing. The types of drafting and revising skills expected of students using a word processor and the spellcheck function are listed, for example, the emergent writer "starts using a word processor to compose text" and "uses a spelling checker to assist in the spelling of unknown words". The early writer "refines keyboard skills; makes changes on screen" and "uses a spelling checker to extend knowledge of the rules of spelling as well as confirming text". The fluent writer "can use more sophisticated features of a word processor" and "uses a spelling checker to make text perfect".

Our findings suggest that although writers met the stages for drafting and editing text using a pencil (as outlined in *Dancing with the Pen)*, many were not able to exercise the skills outlined in the descriptions for revising using a word processor, as they had not been formally taught how to use the tools of a word processor for editing. The findings from this study suggest that students could benefit from being formally taught further basic keyboard skills. It is important that teachers do not rely on students learning these skills at home, or incidentally.

Interviews with teachers and students indicated that at school, word processors and other applications were used mainly for publishing drafts that had been written and edited with a pencil. In essence, the word processor was used as a presentation tool only, reinforcing the idea that revision occurs at the end of the writing process, when in fact it can occur at any stage. As Breese *et al.* (1996) stated, "to write a first draft by hand is compromising the whole nature of the process" (p.69).

Given that most teachers in this study had only one computer actually in their classroom, it is easy to see how this situation has developed. But now that there is an increased focus on ICT in the classroom, resourcing is increasing, and many schools have a small pod of computers available for students to use, it seems timely to change this situation and use computer applications as tools for crafting as well as presentation.

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Appendix A

Parent Introductory Letter

Research Project: Editing and Proof-reading

Date

Dear Parent/Caregiver,

There is not much information available in New Zealand about how children use word processing packages to edit their work, and if the processes they use are different from when they are working on hand-written drafts. Therefore NZCER is conducting research on these processes. The school your child attends has agreed to be part of this project which involves Year 5 students.

As part of this project each child will be observed completing two writing tasks, each of approximately 30 minutes duration. In addition, each child will be given a short interview about the editing processes they normally use and their computer experience. Some data about each child's level of literacy will be collected from their teacher.

Your child's participation in this study would be greatly appreciated. Please complete the attached form and return it to school with your child.

Any information collected for this project will be held in complete confidence in a secure location till June 2001, when it will be destroyed. The results of this study will be given to your school, and will be published as an article for teachers. Your child will not be identifiable in any of the information produced.

This research will have no effect on your child's grades for school assessment.

If you have any questions about the research, please contact Sally or Sue at the phone number, address, or e-mail below.

(04) 3847 939
NZCER
PO Box 3237
Wellington
E-mail: sally.boyd@nzcer.org.nz
E-mail: sue.mcdowall@nzcer.org.nz

Thank you for your time.

Yours sincerely,

Sally Boyd & Sue McDowall
Researchers

Appendix B

Parent/Caregiver Consent Form 2000

NZCER Research Project

Editing and Proof-reading Study

I have read the accompanying letter regarding the study on editing and proof-reading. I understand the purposes of the study. I agree to my child's participation in the study and the collection of information as detailed in the accompanying letter. I understand that:

- this information is to be used for research purposes only,
- my child will not be identified in the study,
- I can have access to the information about my child at any time, and
- the information will only be made available to the NZCER researchers working on the project

Please place a tick in the appropriate box.

I **agree** to my child's participation in the study ❑ *OR* I **do not agree** to my child's participation in the study. ❑

Your full name (please print): .....

The child's full name (please print): .....

Your relationship to the child (please print): .....

Your signature:.....

Date: .....

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

Appendix C

Teacher Introductory Letter

Research Project: Editing and Proof-reading

Date

Dear Teacher,

There is not much information available in New Zealand about how children use word processing packages to edit their work, and if the processes they use are different from when they are working on hand-written drafts. Therefore, NZCER is conducting research on these processes. Your school has agreed to be part of this project which initially involves some Year 5 students, and may also involve Year 3 and 7 students.

As part of this project you would like to interview for approximately 20 minutes on the writing and editing processes you teach.

Approximately 6 students from your class will be selected to participate in the project. Each child will be observed in the classroom by a researcher as they complete two writing tasks, each of approximately 30 minutes duration. In addition each child will be given a short interview about the editing processes they normally use and their computer experience. Some data about each child's level of literacy will be collected from you.

Your participation in this study would be greatly appreciated. Please complete the attached form and return it in the envelope provided.

Any information collected for this project will be held in complete confidence in a secure location till June 2001, when it will be destroyed. The results of this study will be given to your school, and will be published as an article for teachers. You will not be identifiable in any of the information produced.

If you have any questions about the research, please contact Sally or Sue at the phone number, address, or e-mail below.

(04) 3847 939
NZCER
PO Box 3237
Wellington
E-mail: sally.boyd@nzcer.org.nz
E-mail: sue.mcdowall@nzcer.org.nz

Thank you for your time.

Yours sincerely,

Sally Boyd & Sue McDowall
Researchers

Appendix D

Teacher Consent Form 2000

NZCER Research Project

Editing and Proof-reading

I have read the accompanying letter regarding the study on editing and proof-reading. I understand the purposes of the study. I agree to participate in the study and the collection of information as detailed in the accompanying letter. I understand that:

- the information is to be used for research purposes only,
- I will not be identified in the study,
- I can have access to the information I provide at any time, and
- the information will only be made available to the NZCER researchers working on the project.

Please place a tick in the appropriate box.

I **agree** to participate in the study. ☐ *OR* I **do not agree** to participate in the study. ☐

Your full name (please print): .....

Your signature:.....

School name:.....

Date: .....

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

Appendix E

Teacher Interview

Room no:____ Yr level:____ Sch no: ____ Yrs tching:_____ Date:_____

This interview is part of a study being completed by the New Zealand Council for Educational Research. The main purpose of this interview is to collect information on how you teach students in your class to write, proof-read, and edit their work.

This interview should take approximately 30 minutes. You do not have to answer any questions you are not comfortable with. This interview is confidential–you will not be named in any reports from this study. The interview will only been seen by the researchers working on this study.

Do you have any questions before I start?

1) Could you describe the process you teach students to go through when they are writing? Starting from the introduction to the task to.... *(Prompt: planning, conferencing, review, peer review, proof-read, redraft, etc).*

_____

_____

_____

_____

_____

_____

_____

_____

2) Do the students in your class use the same writing process when they are working on the computer or by hand? **yes / no** If no, why not?

_____

_____

_____

3) Do you teach students any specific **proof-reading and editing** skills? **yes / no**
(Prompt: If editing skills are already mentioned start with these.)

Skill?	**How taught?** (Prompt: class-formal/individual-as it arises)

4) Do you teach students any **editing or proof-reading** skills specifically for when they are using a word-processor? *(Prompt: Or do you approach the teaching of any skills differently?)*

Skill?	**How taught?** (Prompt: class-formal/individual-as it arises)

5) What expectations do you have about the proof-reading and editing skills that students will have at this age level? What editing and proof-reading skills would you expect an **average/above average/below average** student to have?

Average student:

Above average student:

Below average student:

6) Are there any **proof-reading or editing skills** you are focusing on teaching or developing with your class at the moment? *(Please describe)*

7) Do you do any type of formal assessment of students' **proof-reading and editing** skills? **yes / no** *(Please describe)*

_____

_____

_____

8) Do you think the quality of students' **proof-reading and editing** differs when they are working on the computer compared to when they are using a pencil?
yes / no How?

_____

_____

_____

9) About how often do students in your class use the computers at school for any type of writing?

Once a day **Once a week** **Once a mth** **Once a term** **Hardly ever**

10) How are computers used for writing in your class? *(Prompt: for drafting, for publishing only?)*

_____

_____

_____

11) What **types** of writing do students in your class do on the computer?

_____

_____

_____

12) Does your school have an overall plan for how computers are used for writing? *(Please describe)*

_____

_____

_____

13) Does your school have an overview of the skills you wish students to develop using computers at different year levels? *(Please describe)*

_____

_____

_____

14) This is the last question of this interview. Are there any other comments you would like to make about students' editing and proof-reading either by hand or using the computer?

_____

_____

_____

Thank you for you time. Do you have any questions?

Appendix F

Student Interview

Child code:_____ Age:___yr_____mth Class:_____ Sch: __ Date:_____

This interview is part of a study I am doing. I am trying to find out some information about how children of your age do your writing when you are using a pencil or working on a computer. I am going to be asking you some questions about how you check your work and change things around.
This interview should take about 15 minutes. You do not have to answer all the questions if you do not want to. Do you have any questions before I start?

1) How much do you like writing? *(read out)*
A lot **A bit** **Middle** **Not much** **Not at all**
middle=neither like nor dislike

2) Do you find it easier to use a pencil or a computer to do your writing? *(read out)*
Easier to use a pencil **Easier to use a computer** **The same**

3) Are there any things that are better about writing using a pencil? *(describe)*

_____

_____

_____

4) Are there any things that are better about writing using a computer? *(describe)*

_____

_____

_____

Now I'm going to ask you some questions about how you check and make changes to your work.

5) When you are writing something at school, how do you usually **check and make changes** to your writing? What do you do first? *(Prompt: is there anything else that you do?)*

_____

_____

_____

_____

_____

_____

Page 1

6) Do you **check** your work in a different way when you are writing on a computer?
yes / no *If yes* - What do you do differently?

_____

_____

_____

7a) When you use a computer do you find **check and making changes** to your work easier, harder, or the same compared with when you are using a pencil?
Easier **Harder** **The same**

7b) Why do you find it easier/harder/the same.....?

_____

_____

_____

Students' computer skills

I am now going to ask you some questions about how you use computers at school and at home.

8a) Do you use the computers at school for writing? **Yes / No**
About how often? *(read out)*
(Check – how many times this year have you used the computer to write?)
Once a day **Once a week** **Once a mth** **Once a term** **Hardly ever**

8b) What writing do you do at school on the computer? *(Prompt: Both drafting and publishing? Poems, e-mails?)*

_____

_____

9) How much do you like using computers for writing? *(read out)*
A lot **A bit** **Middle** **Not much** **Not at all**
middle=neither like nor dislike

10a) Can you remember how old you were when you first used a computer? ____yrs

10b) Were you at home or at school? **home / school / other** _____

11) Do you have a computer at home? **Yes / No**

12a) Do you use your home computer for **writing**? **Yes / No**
About how often do you write on your home computer? *(read out)*
(Check – how many times this year have you using your computer to write?)
Once a day **Once a week** **Once a mth** **Once a term** **Hardly ever**

12b) What writing do you do at home on the computer? *(Prompt: homework, e-mails?)*

_____

_____

13) I am going to ask you some questions about the things you do when you are writing on a computer. When you are working on a computer do you know how to…...

		Yes	No
a)	put letters in capitals?		
b)	add full stops?		
c)	add commas? *(show)*		
d)	add apostrophes? *(show)*		
e)	add speech marks? *(show)*		
f)	get rid of (or delete) a word you do not want to use?		
g)	changing the size of letters to make them bigger or smaller?		
h)	copy a sentence and move it to a different place (use cut and paste)?		
i)	make paragraphs (put spaces between blocks of sentences)? *(show)*		
j)	use spell-check *(red squiggly lines, show if students ask)*?		
k)	use grammar-checks *(green squiggly lines, show if students ask)*?		
l)	Are there any other things that you do?		

Thank you for your time.
Do you have any questions?

On another day we are going to come back and get you to do two different writing tasks, one with a pencil, and one on the computer. Is that okay with you?

Appendix G

Poetic Writing Task – Instructions

I am going to read you a story. After I have finished, I want you to write the story in your own words so that someone in your class could understand what happens in the story. The story I am going to read to you is called 'Rona and the Moon'/'Kaka and Kakariki'.

Read the story.

Now I would like you to write the story in your own words using the computer/on this paper. You may use the paper to make a plan before you begin writing if you want to. Here is a picture from the story to help you remember what it is about.

Please tell me when you have finished your draft.

Appendix H

Rona and the Moon

(Source: illustration by Philippa Stitchbury from Bacon., R. (1984). 'Maori Legends: Seven Stories', Shortland Educational Publications: Auckland.)

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(Source: illustration from 'Kakariki', School Journal, Part 2, No. 1, Learning Media, 1998.)

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Appendix J

Snakes and Ladders – Instructions

Say to the student(s), "Have you ever played 'Snakes and Ladders'?"

Give the student a copy of the picture of the 'Snakes and Ladders' board with the following instructions and read them with the student:

Write a set of instructions on how to play the game "Snakes and Ladders".

Make sure the instructions are clear so children who have never played the game before will know what to do.

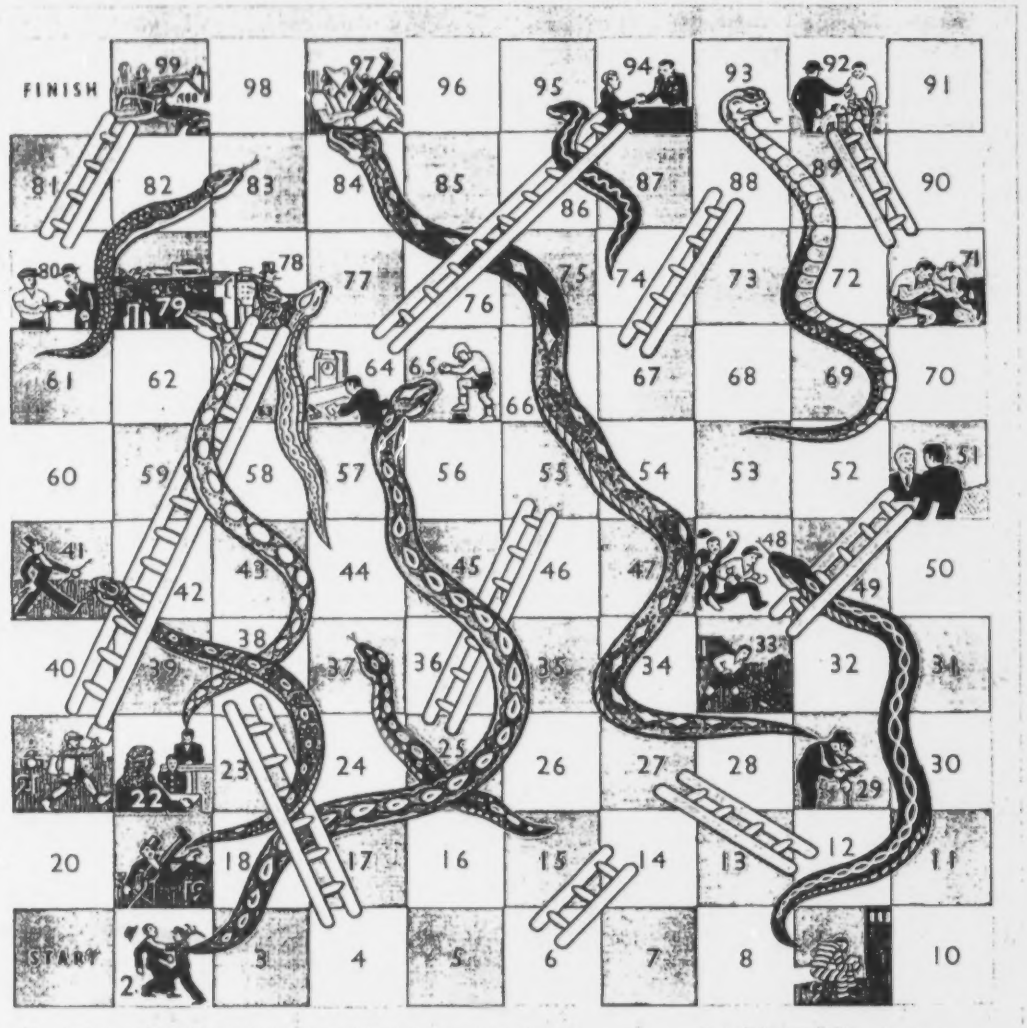
You may write your draft on this paper/the computer.

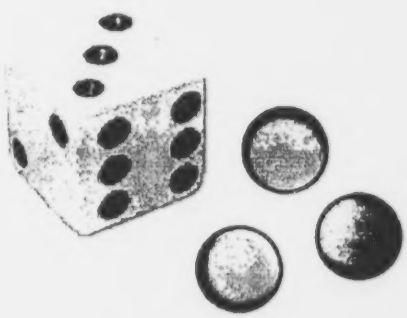
You may use the space below to make a few planning notes before you begin writing your draft if you want to.

Once the student has begun writing the draft say, "Please tell me when you have finished your draft."

Appendix K

Snakes and Ladders – Student Instructions





(Illustration source: 'Snakes and Ladders', MB Games)

BEST COPY AVAILABLE

Snakes and Ladders

Write a set of instructions on how to play the game 'Snakes and Ladders'.

Make sure the instructions are clear so children who have never played the game before will know what to do.

You may use the space below to plan what you will write before you begin.

Appendix L

Snap – Instructions

Say to the student(s), "Have you ever played the card game 'Snap'?"

Give the student a copy of the picture of the playing cards with the following instructions and read them with the student:

Write a set of instructions on how to play the card game 'Snap'.

Make sure the instructions are clear so children who have never played the game before will know what to do.

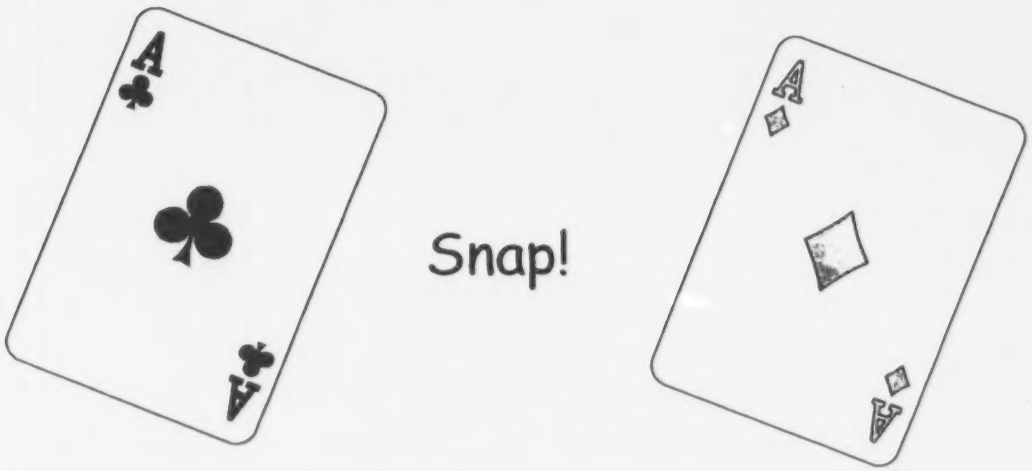
You may write your draft on this paper/the computer.

You may use the space below to make a few planning notes before you begin writing your draft if you want to.

Once the student has begun writing the draft say, "Please tell me when you have finished your draft."

Appendix M

Snap – Student Instructions



Write a set of instructions on how to play the card game 'Snap'.

Make sure the instructions are clear so children who have never played the game before will know what to do.

You may use the space below to plan what you will write before you begin.

Appendix N – Observational Checklist

Tell me when you have finished your first draft.

Date: ___ Schcode: ___ Chdcode: ____ Task: ____ Com / Pen Start writ:____ Finish writ: ___

Writing phase	Examples (e.g., old and new spelling, no. of changes)								Tally
1. Spelling changes									
2. Punctuation	**fullstop.**	**Capital**	**?**	**comma,**	**" "**	**apostro. '**	**!**	**Other**	
a) Change from (give examples)									
b) Insert (give examples)									
c) Delete (give examples)									
3. Grammar	(tense, plural, verb)								
a) Change									
b) Insert									
c) Delete									
4. Word changes									
a) Change									
b) Insert									
c) Delete									
5. Part/full sentence	**changes**								
a) Change (reword)									
b) Insert (part/full sentence)									
c) Delete (part/full sentence)									
6. Order changes									
a) Sentence									
b) Paragraph/block									
7. Paragph/spacing (insert/delete)									
8. Layout changes (font, spacing)									

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9. Did chn use?	Example	yes / no		Example	yes / no
a) Autocorrect		yes / no	f) Computer thesaurus		yes / no
b) Spellcheck		yes / no	g) Dictionary		yes / no
c) Gramcheck (green wiggles)		yes / no	h) Peer assistance		yes / no
d) Spellcheck (tool bar)		yes / no	i) Teacher assistance		yes / no
e) Gramcheck (tool bar)		yes / no	j) Other person		yes / no

Comments:

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Start editing phase:_____ Finish editing phase:_____

Editing phase	Examples (e.g., old and new spelling, no. of changes)								Tally
10. Spelling changes									
11. Punctuation	fullstop.	Capital	?	comma,	" "	apostro. '	!	Other	
a) Change from (give examples)									
b) Insert (give examples)									
c) Delete (give examples)									
12. Grammar	(tense, plural, verb)								
a) Change									
b) Insert									
c) Delete									
13. Word changes									
a) Change									
b) Insert									
c) Delete									
14. Part/full sentence	**changes**								
a) Change (reword)									
b) Insert (part/full sentence)									
c) Delete (part/full sentence)									
15. Order changes									
a) Sentence									
b) Paragraph/block									
16. Paragph/spacing (insert/delete)									
17. Layout changes (font, spacing)									

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18. Did chn use?	Example	yes / no		Example	yes / no
a) Autocorrect		yes / no	f) Computer thesaurus		yes / no
b) Spellcheck		yes / no	g) Dictionary		yes / no
c) Gramcheck (green wiggles)		yes / no	h) Peer assistance		yes / no
d) Spellcheck (tool bar)		yes / no	i) Teacher assistance		yes / no
e) Gramcheck (tool bar)		yes / no	j) Other person		yes / no

19. Computer has?	a) Autocorrect yes no	b) Underlined spellcheck yes no	c) Underlined gramcheck yes no
20. Keyboard skill rating	1 (slow, finding letters, capital etc difficult)	2	3 (fast, easy to find letters, capitals, etc)

Comments:

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Appendix O

Computer Task Student Interview

[ ]

Questions about the process of writing on a computer

Student code_____ **Task** _____ **Sch**____ **Date**_____

I am going to ask you some questions about how you did this writing task.

1a) Read through your story and show me any places where you made changes.

1b) Why did you make this change? *(point to each change).*

Change	**Reason:** Accuracy (spelling, punctuation) Sense (grammar) Interesting Clarity
1	
2	
3	
4	
5	
6	
7	
8	

2) *(Other changes on checklist not noted by student)* While you were working you changed ..... Could you tell me why you changed that?

Change	**Reason:** Accuracy (spelling, punctuation) Sense (grammar) Interesting Clarity
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

3) Did you use the computer spell-checker or grammar check (green and red squiggly lines)?

3a) Spell **yes / no** 3b) Grammar **yes / no**

4) Did you use a dictionary or wordlist? **yes / no**

Appendix P

Pencil Task Student Interview

[ ]

Questions about the process of writing with a pencil

Student code_____ **Task** _____ **Sch**_____ **Date**_____

I am going to ask you some questions about how you did this writing task.

1a) Read through your story and show me any places where you made changes.

1b) Why did you make this change? *(point to each change).*

Change	**Reason:** Accuracy (spelling, punctuation) Sense (grammar) Interesting Clarity
1	
2	
3	
4	
5	
6	
7	
8	

2) *(Other changes on checklist not noted by student.)* While you were working you changed ..... Could you tell me why you changed that?

Change	**Reason:** Accuracy (spelling, punctuation) Sense (grammar) Interesting Clarity
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

3) Did you use a dictionary? **yes / no**

Appendix Q

Writing Sample – Global Quality Rating

RATING CRITERIA

- **Language and writing style appropriate to genre/audience (deep feature).** The audience is children of their own age.

Instructions: Clarity of instructions, present tense, 3rd person, directive, appropriate vocab for genre and audience, complexity of vocab.
Re-telling: e.g., once upon a time, etc., 3rd person, descriptive/use of adjectives, description of characters and setting, appropriate vocab for genre and audience, complexity of vocab.

- **Structure (deep feature)**

Instructions: logical sequence, organisation, structure (e.g., might/might not include sub-headings/"How to"), flow. Covers essential points.
Re-telling: sequence (intro, middle, end), organisation, structure, flow, covers essential points.

When rating, the deep features of writing such as clarity, vocab, and flow are the most important criteria. Surface features such as layout, spelling, and punctuation can be used to decide between 2 equal pieces of writing.

Appendix R

Writing Sample – Rating Scales

1) **Punctuation** (surface) Note: Punctuation "correct" = Existing punctuation is all (nearly all) accurate and no (very little) necessary punctuation is **omitted**.

1 None/occasional accurate use of either full stops or capitals but not both.

2 Moderately accurate use of both capitals and full stops. Could include occasionally correct other punctuation.

3 Mostly correct use of capitals and full stops (including moderately correct use of at least one other type, e.g., commas for listing, ?, !).

4 All (nearly all) full stops followed by capitals, including mostly correct use of one other type of punct **OR** moderately correct use of a variety of punct., e.g., ?, !, commas for listing).

5 All (nearly all) punctuation **correct** including at least 2 other types of punct. correct, e.g., :,', " ".

If direct speech is used student need to include a comma separating direct speech from other words, a capital at start of direct speech, speech marks surrounding direct speech, punctuation such as comma, full stops, ? are within the speech marks.
This does NOT have to include paragraphing or new speaker new line.

2) Grammar/syntax (surface) Note: It is assumed that each level includes the criteria for lower levels. ***Read out aloud – do not take into account lack of punctuation when assessing grammar.***

1 Moderate use of conventional word order. Beginning control of verb forms, e.g., singular/plural agreement and subject/verb agreement. Short sentences with little variation in length, very little use of conjunctions (or overuse of "and").

2 Conventional word order mostly evident, moderate control of verb forms, i.e., singular/plural agreement, subject/verb agreement (tense may be inconsistent). Uses more than 1 sentence in which 2 or more clauses are linked (clause = subject+verb). Uses conjunctions such as but/and/so/if/because. May overuse a conjunction, e.g., and. Little variety in sentence length.

E.g., of 2 linked clauses: The moon went behind a cloud **so** Rona tripped.
If you land on a snake you slide back down the board. **OR**
You slide back down the board if you land on a snake.

3 Conventional word order evident, nearly all verb forms accurate, i.e., singular/plural agreement, subject/verb agreement, and generally consistent tense. Beginning to use a wider variety of conjunctions beyond "and". Doesn't overuse conjunctions such as and/so/but.

4 Beginning use of subordinated structures (e.g., commas used as bracket) with moderate variety in sentence length. Range of conjunctions used.

5 Wide use of subordinated structures in sentences with plenty of variety in length. Grammatical errors rare. Wide range of conjunctions used.

Note: Use the layout scale ONLY for instruction-writing tasks
3) Layout - 5 marks (1 mark for each feature noted):

- Use of new line or missing a line for each new instruction or inserting gaps between blocks of text (not including between title and text).
- Bullet points or numbering.
- Use of title.
- Sub-headings such as "What you need", "Aim of the game".
- Use of any technique to highlight words, including title (word written in captials, bold, larger print, underline, italics, centring e.g., **SNAP**).

Appendix S

Writing Sample – Spelling and Vocabulary Measures

A) Instructions for Counting Spelling Errors

1) RUNNING COUNT: Circle in red pen all the words that are mis-spelt (including all words that are spelt correctly but used in the wrong context (e.g., their=there=they're). DO NOT count errors in using singular/plural form as mis-spelt, e.g., feather/feathers if the word is spelt correctly. DO count mis-spelt plural forms, e.g., branchs. Check all "of/off" and "to/too". Then count the total number of mis-spelt words including repeats. Record this number as **C1=XX**.

COUNT AS SPELLING ERRORS

- Any word, including compound words, that has incorrect spacing added (count as 1 mistake), e.g., *un til, who ever, what ever, on to (if putting on a surface).*
- Contractions that are missing an apostrophe (dont) or have an apostrophe in the wrong place (do'nt). DO NOT count misused apostrophes for ownership (snakes head).
- Mis-spelt plural forms, e.g., branchs.
- Include words in titles and headings.
- Words that are correctly spelt but not in the right context, e.g., more=move, pill=pile.
- American spelling, e.g., color.

DO NOT COUNT AS SPELLING ERRORS

- Proper nouns, e.g., Kakariki.
- Two words that seem to be run together by accident, e.g., therewas.
- Dice and die used incorrectly.
- Misused apostrophes for ownership (snakes head).
- Single/plural form errors if the word is correctly spelt, e.g., feather/feathers.
- Errors of tense that are correctly spelt, e.g., sweared.
- Z in place of S, e.g., realize.

2) DICTIONARY COUNT: Highlight in blue the first time each NEW spelling mistake occurs. Count the total number of different mis-spelt words. Record this number as **C2=XX**.

3) HOMOPHONE COUNT: Highlight in green words that sound exactly the same, but are used in the wrong context, and are not mis-spelt (homophones), *e.g., their=there=they're, know=no, where=we're, to=two=too, or=ore, which=witch, roles=rolls.* Record this count as **C3=XX**.

4) CONTEXT COUNT: Highlight in yellow words that are correctly spelt but are but are used in the wrong context, e.g., *pill=pile, released=realised, more=move, or=our, were=where, who=how, of=off, a=an.* **C4=XX**.

If in doubt look up in Concise Oxford (6th Edition).

B) Instructions for Counting Vocab Complexity

Highlight in orange ALL words that contain 7 letters or more the FIRST time they appear. Do a total count of these words **C5=XX** (DO NOT count repeats).

COUNT

- Mis-spelt words that, if spelt correctly would have contained 7 or more letters, e.g., fether for feather.
- A long word incorrectly written as 2 short words, e.g., in between, who ever.
- Count contractions (count apostrophes as 1 letter), e.g., couldn't = 8 letters.
- Correctly hyphenated words.
- Made up words that contain 7 or more letters (as long as they are not 2 small words run together), but not grammatically incorrect words, e.g., sweared.
- Include words in titles and headings.

DO NOT COUNT

- Proper nouns, e.g., Kakariki.
- Words mis-spelt as longer (when 2 or more words are added and do not make up a new word, e.g., "lightmoon").
- Wrongly hyphenated words.
- Abbreviations of longer words.

Common words with 7 or more letters

- although
- another
- beautiful
- because
- calling
- carefully
- children
- counter/s
- decided
- feathers/feather
- forever
- frightened
- grabbed
- highest
- himself/herself
- jealous
- ladders
- laughing
- punished
- putting
- shouted
- showing
- telling
- thinking
- thirsty
- thought
- through
- tricked
- walking
- whatever
- whoever

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